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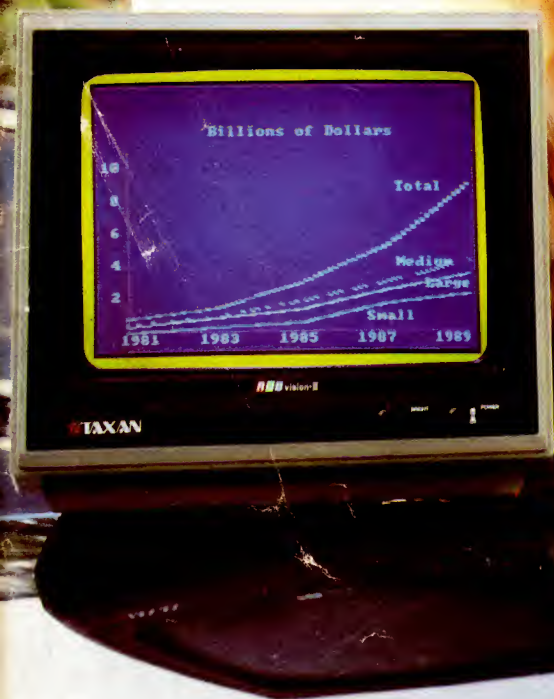
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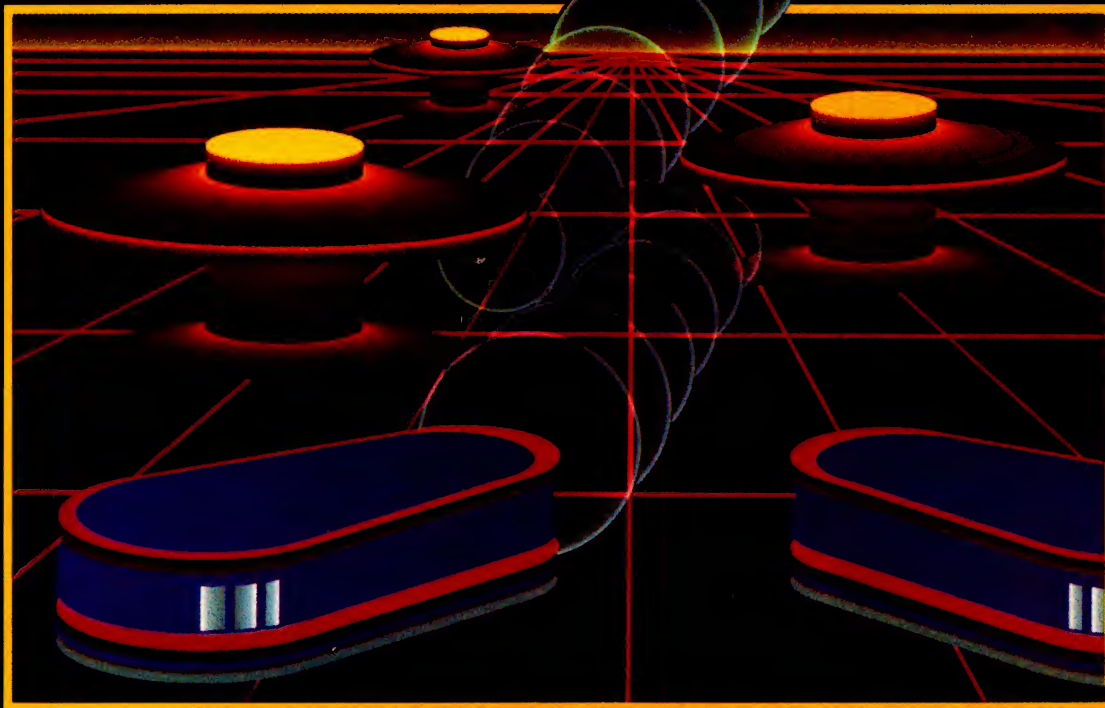
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Hot Cider

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The introduction of the Macintosh at the Apple shareholders' meeting was an event—with wildly enthusiastic, screaming Apple employees packing the auditorium. Steve Jobs dramatically announced that the Apple target was IBM, throwing down the gauntlet. (*Forbes* magazine did suggest that this might have been just a media move to try and impress stock market analysts and thus boost the sagging Apple fortunes.)

The Mac looks good. I suspect that the success of the system may hinge on how fast software firms get applications packages out since the two programs which come with it are probably a bit restrictive for most users. In the meantime it's the IIe which has to keep the Applecart from being upset.

With \$160 million in sales in December (110,000 model IIe's) not all of Apple's attention has been on the big and little Macs. These new systems may or may not fly, so Apple has a strong vested interest in keeping the II going. Indeed, even at the height of the ado over the Macintosh there were hints being dropped of new II models to come.

The announcement of the 65802 and 65816 chips at Comdex—high speed versions of the venerable 6502—suddenly opened up the potential for several more years of Apple II life. The hints that a portable IIe model is in the works would seem to reinforce this idea. Having used a Radio Shack Model 100 for a year now, I'm in a position to testify that a briefcase computer sure seems like the way to go.

The field is wide open for Apple to bring out a lap computer with the

65816 CPU chip and mate it to an updated Apple II series. This would have the enormous benefit of continuing the software compatibility of this system, right from the small portable computer up through the II, IIe and any new II model. It will be nice not to lose about 20,000 applications programs, right?

The hints on the Apple portable have been suggesting an April announcement. The state of the lap computer designs suggests that we will probably see a 128K system with an 80-by-16 line LCD screen and using the 65802 CMOS processor. They just might build in one of those 3½-inch disks too. It would cut down on the cost, size and weight of disk drives, so it's a possibility. Did the need for that disk for a portable computer help swing the Mac and Lisa computers to this new format?

My own experience during the last year has shown me that I really need a small portable printer to go with my computer. I would rather that it were not built-in like the Sharp 5000—too much bulk and weight for the infrequent need of the printer. Even one using 4-inch to 5-inch paper would be fine.

Apple can't afford to wait too long to introduce the IIp. We know that Commodore is well along with one, as are several other major firms. The impact of the 100 was not lost on the industry. The only strange part of it has been the lack of real push by Tandy to take advantage of their coup. They had a full year lead, but didn't do much about it. So the field is still wide open for a firm to come in and make it big in briefcase portables. Hello, Apple, are you ready? ■

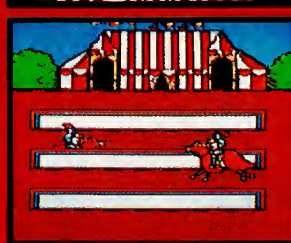
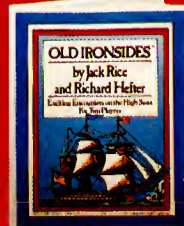
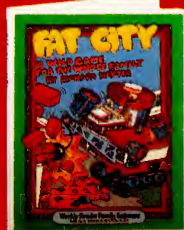
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Fermentations

by Bob Ryan
inCider staff

In the Wake of Macintosh

Apple Computer did a lot more than introduce a new machine at its stockholders' meeting last January 24th. Although most of the focus was on the Macintosh, John Sculley, president of Apple, was careful to point out that Apple will continue to support and enhance the Apple II product line. He stated that several new products were under development for the Apple II family and that some of these would be introduced this year (in fact, the IIe portable may be in the stores by the time this piece sees print). He pointed to the release of ProDOS and to the introduction of mouse technology for the IIe as evidence of the company's belief that the II family will remain a viable technology through the end of the decade. These public pronouncements, coupled with Steve Wozniak's return to Apple to work on the II, mean that Apple II owners can expect the same level of innovation and support from Apple that they have enjoyed since the machine was introduced.

Apple is not the only source of support for the Apple II product line. Magazines like *inCider*, which let readers know how they can use their computers, supply a lot of underpinning. The same questions concerning the level of Apple's support for the IIe are applicable to the Apple magazines. Here at *inCider*, we've decided that we will not dilute our support for and coverage of the Apple II family. We remain dedicated to bringing you the best coverage possible of Apple's 6502-based computers.

* * *

It is a sign of the growing maturity of the personal computer industry that technological excellence is no longer enough to guarantee the success of a product in today's volatile

marketplace. These days, marketing strategy has pre-empted design elegance as the most important concern of management. This switch in emphasis did not come about by accident. When the largest corporation in the industry (you know who) is also one of the best marketing outfits in the universe, it's an easy bet that those companies which don't develop some marketing savvy in a hurry will fall by the wayside.

The increased emphasis on marketing means that consumers (you and me) are going to have to work a lot harder when making purchasing decisions. Basically, a consumer looks for utility and value. He or she wants products which are useful, easy to understand, and which carry reasonable price tags. It used to be that all you had to worry about was sifting through the mountain of information concerning all of the computer-related products that are out there. Nowadays, you first have to deal with mountains of hype before you can even start examining product specifications.

The greatest potential danger of this new emphasis on marketing is that it could stifle much needed innovation. This could come about in two ways. First, established companies could feel the heat from stockholders to cut back R&D budgets to compensate for increased marketing costs. Second, the small start-up companies which provide so much of the excitement in this industry could find themselves frozen out of a market which demands huge initial investments just to get products brought to the attention of consumers. Both of these forces are already at work to a limited degree. Should they become too pervasive, the Japanese could easily exploit the situation and make great inroads into the American market.

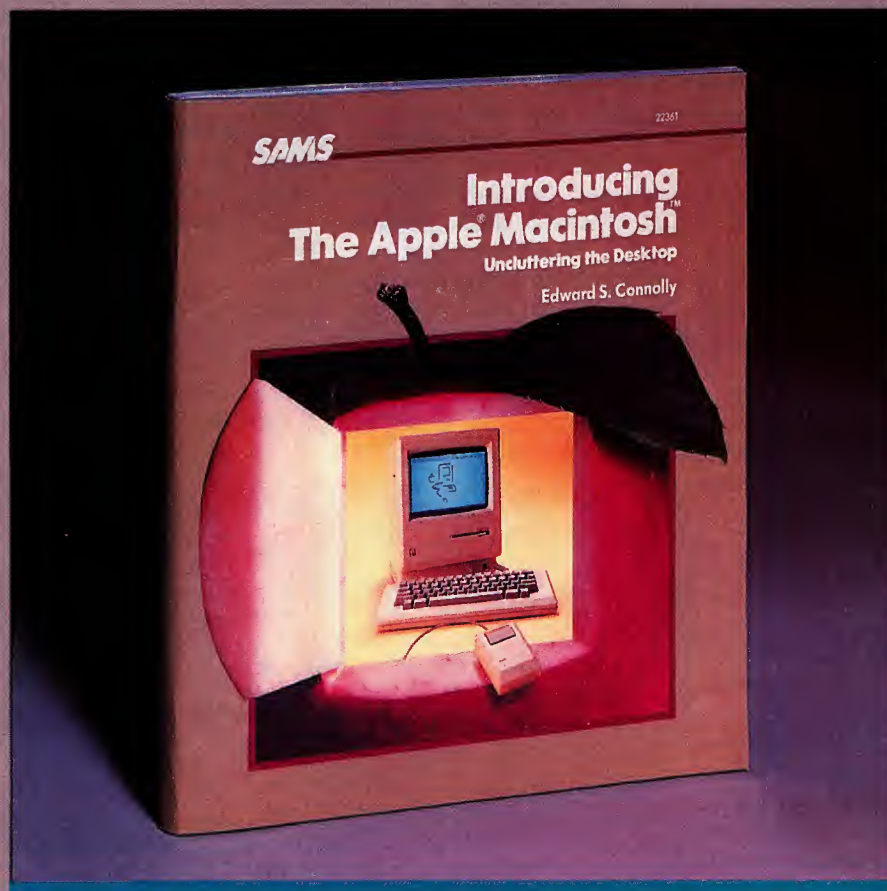
It seems that Apple Computer, Inc. has resisted the temptation to cut back on product development in order to finance vastly increased marketing costs. Apple took its lumps when it reported that profits for the fourth quarter of 1983 were off 75% in comparison to the same period in 1982. Although December was Apple's best month ever, with over 110,000 units shipped, development and start-up costs for the Macintosh and Lisa 2 and the cost of enhancements for the Apple II family of products ate up most of the anticipated revenues. In effect, Apple sacrificed short-term profit in the interest of long-term growth and vitality. I think that a lot of American companies should take heed of Apple's example. (I just hope that this strategy doesn't flop; I hate the taste of my own words.)

* * *

One of the primary functions of a computer magazine is to supply the readers with information that they can use to make informed decisions about which products to buy for their computers and which to avoid. Hardware and software reviews are the best means at our disposal to pass along this information to you. Therefore, it is with a contrite heart that I reveal how *inCider* has failed thus far to bring you any information about one important product and how I played a major role in keeping this product out of the hands of one of our reviewers.

It was a crisp autumn day here in New Hampshire when UPS dropped off a review copy of PFS:Write (Write, for short), a new word processing program from Software Publishing Company. Recognizing that this was an important new product from a major software publisher, I decided to try the program out before

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putting it into the hands of a reviewer. Well, that was my big mistake. I was up to speed with the program in five minutes, and after one half-hour I had learned 95% of the functions that I ever use in a word processor. Since then, I have retired my Screenwriter II program (Screenwriter is more powerful than Write, but it is not as easy to use) and I now use Write for word processing on my Apple IIe.

I was so pleased with Write that I didn't want to send it out for review at all, so I embarked upon a subtle campaign to convert the rest of the staff into Write users (I didn't want them to give me any flack about keeping the program for staff use). Before long, I had all the editors save one (a Wordhandler fanatic) using Write and I didn't have to worry that anyone would insist upon giving the program to a reviewer.

Well, there you have it, folks—a tawdry tale of cynical self-interest (it sounds like a sub-plot from *Dallas*). But seriously, I do apologize for keeping our loyal readers (that's you) in the dark up to now about this excellent word processor. If you are in the market for a word processor, and you don't think you'll be creating large documents or that you'll require a lot of special features, then I suggest that you give serious consideration to purchasing PFS:Write.

* * *

One interesting new product that you *will* see reviewed in a future issue of *inCider* is the Polaroid Palette. I was in Cambridge, MA recently for a demonstration of the Palette, which is Polaroid's first entry into the micro-computer peripherals market. The Palette can take a screen produced by any number of popular graphics programs for the Apple and create a high-quality color print or slide from it. The Palette can also substitute any one of 72 different colors for each of the eight Apple hi-res colors, and, if you don't like the colors that Polaroid provides, then Palette lets you create your own!

The Palette is aimed squarely at the business market and is being sold through selected computer stores. Po-

laroid is placing the system in retail outlets that will be able to provide the kind of quality support and service that the serious business person expects.

The best thing about the Palette system is that it is so fast. Using it, you can create color prints from Apple screens in a very short time and mounted color slides in ten or fifteen minutes. It is also a complete system. The system comes with the Palette, software, two camera backs, Polaroid's instant slide processing unit, and a device to mount your slides. This is an expensive peripheral, about \$1500, but I think that it will make a big splash in the business market. We are going to take our time evaluating this product, but you should see a comprehensive review in *inCider* by summer.

* * *

People around here are still talking about the "1984" commercial that Apple ran during the Super Bowl just prior to the introduction of the Mac. It's not that we have long memories around here, just long lead times. (I'm writing this on the last weekend in January.) Opinions about the commercial are split between those who loved it and the old fogies who thought that it was an improper way to introduce a serious business computer. I really don't have an opinion one way or the other—I just rest easier knowing how much that commercial must have been appreciated by the boys at International Big-brother Machines Corp.

* * *

Recently, the folks who supervise the College Board exams made an important announcement. They stated that their advanced placement test for computer science would be based upon the Pascal language. This is an important development for our secondary schools because they will now have a language to focus their computer science courses around. It is also important to parents who want to supplement their children's computer education by providing the

necessary tools at home. It is clear that Pascal will have to become one of those tools.

The problem with Pascal is that it is so much harder for people to learn than Basic. This is not due to the language itself, but rather to the clutter that surrounds any Pascal implementation. You can't even begin learning Pascal until you have mastered an editor, a compiler, and a linker. Also, a Pascal program must be recompiled whenever you make even the slightest change in the program. This really slows down the learning process.

Of course, schools and individuals could get around this problem by buying a Macintosh and then purchasing MacPascal, which does not require a compiler. It is interpretive, like Basic, and it eliminates the need to deal with editors and compilers and such. The problem is that schools and parents already have a heavy investment in their Apple II's and they won't be too keen on scrapping their current hardware and software systems just to get MacPascal. The best of both worlds would be if a version of MacPascal could be made available for the Apple II. This, fortunately, is exactly what is going to happen.

MacPascal was developed by Think Technologies of Lexington, MA under the generic name of Instant Pascal. In fact, the earliest versions of Instant Pascal were developed for the Apple II. It was only after the Macintosh design team saw the early prototypes that they enlisted Think Technologies to write MacPascal. As a result, MacPascal was the first version of this new interpretive Pascal to be released to the public.

MacPascal will not be alone for long. Think Technologies plans to have an Apple II version of Instant Pascal on the market by the time schools open in the fall. It is uncertain at this time whether it will be marketed by Think Technologies or by Apple (I'd guess Apple). In any event, this product should make a big splash with educators and parents. It will make learning Pascal as easy as learning Basic. Stay tuned for more developments. ■

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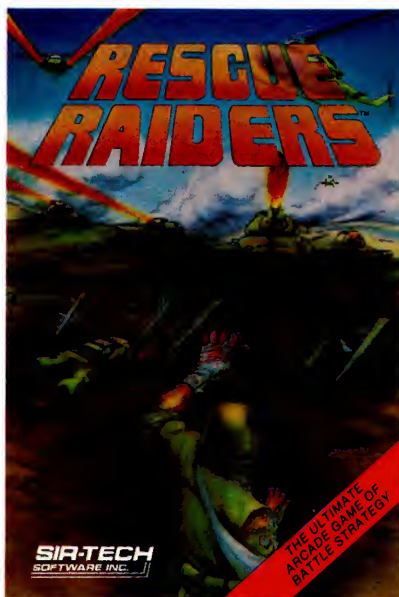
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Letters

La Manzana

I wish to acknowledge the fine quality of your magazine. It has technical depth and at the same time it is cheerful enough to provide real enjoyment.

I own a "well-dressed" Apple with a lot of software, some of it written in Spanish. I would like to establish contact with other Apple users—either directly or via modem—here in Mexico as well as in other Latin American countries. This might make it possible to exchange programs and information in Spanish and possibly even lead to the establishment of a SIG.

J. Luis Zaragoza
Dr. Vertiz # 1218
Col. Vertiz Narvarte C.P. 03600
Mexico, D.F.
Mexico

More on Beagle Basic

In your review (March) of Beagle Basic, Mr. Bragner seems to have touched upon most of the major features of the language in what appears to be a fair review. I would, however, like to shed more light on three particular subjects covered in the review.

- Mr. Bragner mentions that renumber programs trip up on the new ELSE command. This is true only if ELSE is followed immediately by a line number. However, if you precede each line number with a GOTO, then renumbering will work properly.

- Under the section "Observations and Suggestions," Mr. Bragner says that the cursor in Beagle Basic should be different from the cursor in normal Applesoft. He apparently is referring to the prompt character and not the cursor. The prompt, unlike the familiar cursor, does not move and is normally a "J" for Applesoft or a ">" for Integer Basic.

The address given for the prompt character should read "\$D44)" rather than "\$S440."

While it is quite easy and safe to change the cursor, it is very dangerous to change the prompt character.

Not only can this goof up DOS, GPLE and other programs, it can also cause you to lose whatever Basic program might be in memory.

If the only reason Mr. Bragner wants a new prompt is so that he can be sure he is still in Beagle Basic, I suggest changing the sound of the bell (preferably to something more pleasing); then all that's required to verify that the new features are still in control is to type a control-G (followed by a control-X, of course).

- Concerning copyrights and royalties, Mr. Bragner is right on the money (forgive the pun). There is no licensing fee for Beagle Basic. Beagle Bros. does require that you mention their name in all software and accompanying documentation that might include Beagle Basic.

Thank you again for your favorable review.

Mark Simonsen
Beagle Bros.
7th Floor
4315 Sierra Vista
San Diego, CA 92103

Timely Help

Two days before the January issue arrived I was asked to help out with team assignments and scheduling for my son's soccer league. What a thrill to see the article about Bert Smith's work in the very area I was thinking about. Please publish any available documentation, listings, etc. There are probably hundreds of volunteer "league officials" like myself who have the same need.

Joe Braun
5007 Elmwood Ave.
Los Angeles, CA 90004

Disappointing

Congratulations on a great magazine! As a subscriber to several, I rate yours the best.

However, I was disappointed in "Apples in Real Estate" on page 44 of the January issue. It promised much and delivered little. Not only is it in a language foreign to the Apple—as the author states—but even with the

changes advised it prints out unattractively. Not up to your usually high standards.

Anthony Capone
The Nautilus Computer
27 Nautilus Drive
Hampton Bays, NY 11946

Sorry, Wrong Number

Inadvertently, we included the wrong telephone number in recent ads with *inCider*. The correct number is 1-800-227-3800.

We hope that the incorrect number caused no inconvenience to readers of the magazine.

Marcel Lapierre
Marketing Director
Ibidinc
PO Box 2574
Springfield, MA 01101

SinCider?

The ad for strip blackjack on page 145 of your February issue was in *very bad taste!* Is *inCider* to become the *Hustler* of the computer magazine world?

John Janott
8223 Highland Pl.
Munster, IN 46321

Another Vote for Bar Codes

In the November issue, on page 14, you asked for response in favor of inclusion of a bar-coded table of contents. If a suitable cheap reader is advertised and a reading program is provided, I am in favor of a trial period of at least six months. HP's bar code reader at \$125 is not a satisfactory answer!

But why limit it to the table of contents? If the initial experiment is well received, go on to bar coding the programs. This was tried in *Byte* seven years ago but evidently failed for want of a good, cheap bar code reader.

Also for your serious consideration: an article on bar code readers in supermarkets would be of interest to many readers. The sloppiness of waving a package over a dirty glass plate—at any angle—and having the

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register beep that it read the code is truly amazing and a boon to the industry in labor, saving labor at both the checkout and in inventory control. How is this miracle accomplished?

Charles A. Mills
3343 Overlook Road
Zellwood, FL 32798

Consumer-Oriented Author

Thought you might like to know that I had a problem with "Crypto," one of the programs in your August issue. I wrote to the author, Bob Marshall, for help. He was swift and courteous with the answer. Obviously, when you pick articles and authors, you pick with the consumer in mind. I appreciate that.

Noel Johnston
3119 West 6th St.
Greeley, CO 80631

Serpentine Addition

I have just finished the February issue and I wanted to write and compliment Dennis Marks on his "Serpent" game. It is easily the most rewarding arcade game that I have poked in from a magazine in a long time. The shortness of the listing adds significantly to the rewards of typing it in. It is a prime example of the "just

```
192 IF XC = 1 AND LL > 4 THEN FOR
    II = 1 TO 5: XDRAW 1 AT STZ(
    L,0),STZ(L,1):L = L + 1: IF
    L = 801 THEN L = 1
194 IF XC = 1 AND LL > 4 THEN NEXT
    :LL = LL - 5: VTAB23: HTAB
    10: PRINT "SCORE: ";LL;" ";
```

Listing, Serpent modification.

one more game" genre that keeps us up late into the night.

I have a suggestion that I feel adds a lot to the tension of the play. As written, the game allows one to ignore difficult boxes and only go for the easy ones. Consequently, I found myself playing safe and not attempting the long shots. As a result, I was amassing very large scores of over 300, but I was getting bored.

The addition of the two lines in the listing to the program penalize

the player five points for every box he does not get. This really steps up the pace for the player and suddenly scores of 200 are not so easy to come by.

Thomas J. Zuchowski
304 Wood Run Court
Winston-Salem, NC 27103

Tips from an Author

As an occasional contributor to *in-Cider*, I feel compelled to let readers know some tips that would make it easier for an author to answer their questions.

When you send a letter to an author, please include a hard copy listing of the program as it is entered in your computer. This will enable the author to spot any problems relating to keyboarding of the program. Please try to debug your own programs first. Don't rely on an author as a "debugging tool." Finding your own errors can be a very useful learning tool as well.

Also, include a copy of any output you receive, if the program is designed to provide printed output. If it is screen-oriented, then a screen dump of the text screen would be most useful, too.

Finally, enclose a self-addressed stamped envelope so the author may more easily reply to your questions. Remember that the circulation of *in-Cider* encompasses many thousands of people, and if only one or two percent of those people had questions to be answered, the postage for mailing out responses could add up to a pretty hefty sum.

an author

If You Can't Beat 'Em, Join 'Em

Given the (apparently) legal influx of what amount to Apple II Plus clones, the best approach for Apple to follow is what they should have done when the Asian clone problem started in the first place: Join it. There are factories in places like Taiwan that produce high-quality printed circuit

boards. Apple could contract with an existing factory and save a bundle in start-up costs. The rest of the components for an Apple can be readily obtained at bargain prices both here and abroad. So why doesn't Apple go into the Apple II Plus kit business instead of trying to stop everything at customs?

If they packaged the kit with real Apple II Plus ROMs and high-quality Heathkit-style documentation, they could drive the fakes out of business overnight. Let Apple dealers sell the kits, plus offer a good factory repair service. Heath has been using this formula successfully for years. Since the manufacturing costs on a board with as many components as the II Plus are the biggest part of the retail purchase price, letting the buyer do the building and testing should drop prices very low.

As for buyers, that should be no problem. With all the existing software, there's a big market waiting. Wouldn't you rather have a real Apple than a fake?

On another subject, one thing you can say about Apple Computer is that they seem to be one of the few companies in business with a coherent long-term business plan. They don't change everything they're doing every time the wind shifts or (like Commodore) every time outside software houses get a bunch of stuff written.

F. Keuchmann
8113 NE 25th Ave.
Vancouver, WA 98665

Your solution to the Apple problem isn't quite as good as the one Apple came up with: a new factory that is even more efficient than those in Asia.

With few exceptions, the Apple clones from Taiwan are built with child labor using surplus video game parts. They are built to be as cheap as possible. I know of no real production-line plants making these clones on Taiwan. Were Apple to try and use these facilities they would run in to severe quality control problems.

Wayne

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Fudge It!

by Don Fudge

Introduction to Function Plotting

This month I introduce the concept of a *function plotter*. A function plotter is a utility that solves and graphs equations (functions) that represent mathematical relationships between variables. The equation might be simple like $Y = X - 3$, or more complex like $Y = \sin(X)$ or $Y = 3(\sin(1/3(X - \pi/3)))$. A bell curve in statistics, a parabolic curve in physics and astronomy, a cosine curve in trigonometry, a square wave curve in electronics, and a learning curve in psychology are all examples of graphed functions.

A good function plotter can solve and graph almost any equation, produce tables of X and Y values that satisfy the equation, find the area

under a curve, overlay graphs of related functions for comparison, and evaluate formulae for fit to a set of data.

A function plotter should label graphs, and it could color in the area under a curve for greater visual impact. Whether displayed on a monitor screen or printed out, function graphs are excellent visual aids for many types of educational presentations.

Empirical Data and Formulae

What is the difference between a plot of business or other collected data and a plot of a formula? Both depict one variable as a function of another. Sales as a function of month

is analogous to sine as a function of angle. However, the former represents a relationship that is unpredictable in that it is based on empirical (observed) data while the latter represents a predictable theoretical relationship. Empirical data is often assessed and analyzed by comparing a graph of it to that of a related formula.

Scatter Charts

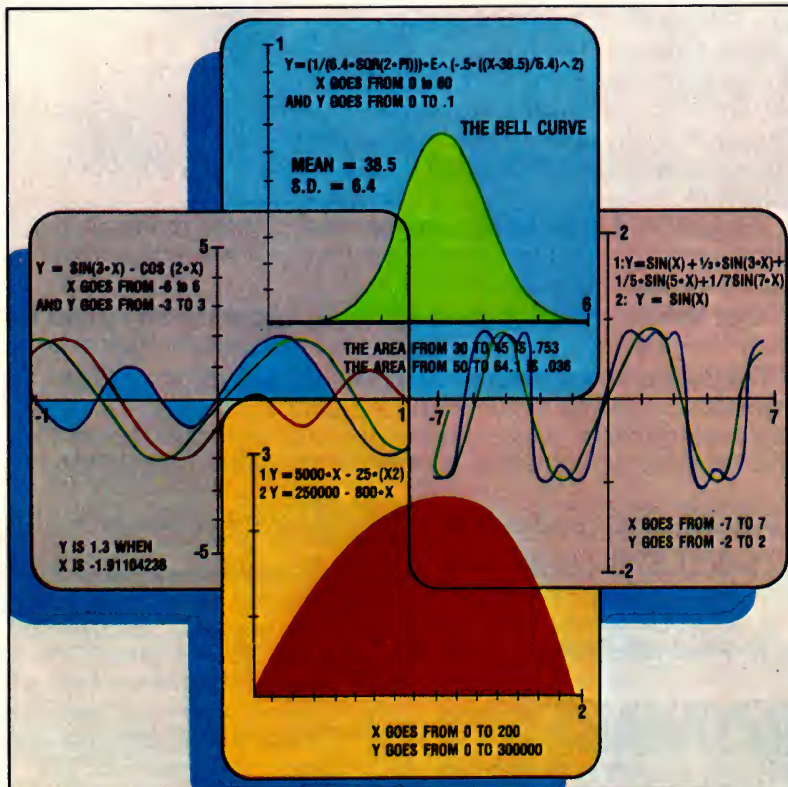
A *scatter chart* is a graphic tool used in prediction, trend study and correlation. *Prediction* is estimating a Y given an X. For example, if a student earned a 3.5 grade point average in high school, what would that student's college grade point average most likely be?

A function plotter would create the scatter chart using data from a sample group of students. The grade point averages of these students would be input, then the program would draw a prediction line (called a *regression* line) expressing the most probable general relationship between high school and college grades based on the sample group.

A Sample Function Plotter

This article contains a program called Function Plotter (Listing 1) that creates graphs with positive values of variables. You could modify it to cover the full range of four quadrants. As it is, you will find that a function like $Y = \sin(X)$ will be represented only by the segments of the curve above the X axis. A function like $Y = 1 + \sin(X)$, however, because it does not go negative, will appear in its entirety.

Address correspondence to Don Fudge at Avant-Garde Creations, PO Box 30160, Eugene, OR 97403.



Function Plotter includes the option to fill in under a curve. You can change the color by inserting HCOLOR=1 (or 2) after THEN in line 222 and adding HCOLOR=3 at the end of the line. You can also opt for solid or dotted graph lines; for absolute accuracy choose dots. If you like, you can overlay one graph on previous ones by retaining hi-res screen 1.

When asked for the increment in the X-axis scale, choose a reasonable one for the function. For example, .05 would be good for $Y=1+\sin(X)$. Your response to START PLOTTING AT X= determines where on the X axis the graph will begin. I generally use 0. At any rate, don't choose a negative value, since this program doesn't plot negative values.

As it calculates points on a graph, Function Plotter emits clicking noises—one click per point—to demonstrate how long each calculation takes. Delete lines 158 and 180 if you prefer peace and quiet.

Program line 10 is where the equation to be plotted resides. To make sure enough space is reserved for long and complex formulae, you must do something that'll seem a bit crazy. Type in $10Y=1+\sin(X)$, then press the space bar precisely 221 times, followed by a return. *Do not* put any spaces in the first (formula) part of the line, and *do not* forget the quotation mark. After all this, type POKE 16429,32 and press return, then continue typing in the listing.

Since it is vital that lines 0–10 be correct, I have provided a double-check system. When you have finished typing in Function Plotter (remembering to include POKE 104,64 and POKE 16384,0 beforehand), access the system monitor with CALL -151 and type 4000.4117 for a printout of the contents of RAM addresses \$4000–\$4117. These addresses contain Function Plotter lines 0–10 in their tokenized form.

Refer to Listing 2 in this article. If your contents of addresses \$4000–\$4117 are not exactly the same as Listing 2, you'll have to do lines 0–10 again. Note that the fourth byte in the 4108 line must be a 00. That's

Listing 1. Function Plotter.

```

0 DIM Y(281)
1 ONERR GOTO 63990
2 GOTO 30
10 Y=1+SIN(X)

(Note: Type " at the end of line 10, then hit the space bar 221 times.)

15 RETURN
30 IF FA = 0 THEN FA = 1: HOME : INVERSE : LIST 10: NORMAL
  : PRINT : PRINT "ABOVE IS THE CURRENT FORMULA": VTAB
  2: PRINT " ": VTAB 10: CALL - 868: VTAB 22: PRINT
  "TO REPLACE IT HIT ESC. ANY OTHER KEY WILL PLO
  T IT."
31 GET AS$: CALL 1002: PRINT CHR$(13): IF ASC (AS$) =
  27 THEN 288
32 Y = 1
35 HOME : VTAB 21
40 X = 1: GOSUB 10
50 POKE - 16368,0
60 OV = 0
62 INPUT "FILL IN UNDER GRAPH LINE? (Y/N): ";AS$: IF LEN
  (AS$) = 0 THEN 62
63 FI = 0: IF ASC (AS$) = 89 THEN FI = 1: GOTO 66
65 INPUT "SOLID PLOTTING OR DOTS? (S/D): ";FG$
66 INPUT "OVERLAY WHAT'S ON SCREEN? (Y/N): ";AS$: IF A
  S$ = "Y" THEN OV = 1
70 INPUT "X SCALE INCREMENTS: ";XI
90 INPUT "START PLOTTING AT X=";S
100 N = 279
101 HOME : VTAB 22: FLASH : PRINT "CALCULATING": NORMAL
102 XM = XI * N: IF XM > 279 THEN XM = 279
105 IF OV = 1 THEN POKE - 16304,0: POKE - 16297,0:
  HCOLOR= 3: GOTO 110
106 HGR : HCOLOR= 3
110 HPLLOT 0,0 TO 0,158 TO 279,158: FOR A = 0 TO 279 STEP
  28: HPLLOT A,159 TO A,155: NEXT
115 HPLLOT 279,159 TO 279,155
120 FOR A = 0 TO 158 STEP 16: HPLLOT 1,158 - A TO 4,15
  8 - A: NEXT
125 HPLLOT 1,0 TO 4,0
128 Q = 0: YM = 0
130 FOR X = S TO N * XI STEP XI
140 GOSUB 10
150 Q = Q + 1: Y(Q) = Y
155 IF YM < Y THEN YM = Y
158 PK = PEEK ( - 16336)
160 NEXT
162 YR = 158 / YM: S = S / XI
170 FOR Q = 1 TO N: Y(C) = Y(Q) * YR
175 IF Y(Q) < 0 THEN Y(Q) = 0
180 PK = PEEK ( - 16336)
190 NEXT
200 Y(N + 1) = 0: Y(Q + 1) = 0
202 Q = 0
205 FL = 0
210 FOR X = S TO N
220 Q = Q + 1: IF 158 - Y(Q) < 0 OR 158 - Y(Q) > 279 THEN
  225
221 HPLLOT X,158 - Y(Q)
222 IF FI = 1 THEN HPLLOT X,158 - Y(Q) TO X,158
223 IF FL = 1 THEN HPLLOT TO XX,YY
225 IF FL = 0 AND FG$ = "S" THEN FL = 1
230 XX = X: YY = 158 - Y(Q)
250 NEXT
255 HOME
260 VTAB 22: PRINT "HIGHEST X LABEL: "XM" X INCR.:
  "XI: PRINT "HIGHEST Y LABEL: "YM
270 GET AS$: PRINT "X SCALE TICS: "XM / 10: PRINT "Y S
  CALE TICS: "YM / 10: GET AS$
280 INVERSE : LIST 10: NORMAL : PRINT : PRINT
281 VTAB 12: PRINT " ": VTAB 20: CALL - 868
288 GOTO 700
290 HOME : GOTO 60
700 TEXT : PRINT : INVERSE : PRINT "HIT RETURN TO RE-
  PLOT CURRENT FORMULA": NORMAL
702 PRINT "ENTER THE FUNCTION. EXAMPLE: Y=1+SIN(X)": PRINT
  : PRINT : INPUT FFS$: IF LEN (FFS$) = 0 THEN 720
705 FFS = FFS$
710 GOSUB 750
720 X = 1: GOSUB 10: GOTO 290
730 INVERSE : PRINT " ": PRINT "NOT VALID APPLESOFT": NORMAL : GOTO 700
750 TE = 16421: FFS = FFS + " ": FOR Q = 1 TO LEN (FFS) -
  2: A = ASC ( MID$( FFS,Q,1)): B = ASC ( MID$( FFS,Q
  + 1,1)): C = ASC ( MID$( FFS,Q + 2,1)): DU = FRE(0)
880 IF A = 42 THEN A = 202: GOTO 1160
890 IF A = 43 THEN A = 200: GOTO 1160
900 IF A = 45 THEN A = 201: GOTO 1160
910 IF A = 47 THEN A = 203: GOTO 1160
920 IF A = 61 THEN A = 208: GOTO 1160
930 IF A = 94 THEN A = 204: GOTO 1160
940 IF A = 83 AND B = 71 AND C = 78 THEN A = 210: GOTO
  1100

```

Listing 1 continued.

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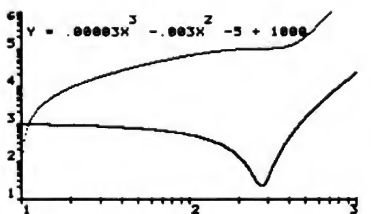
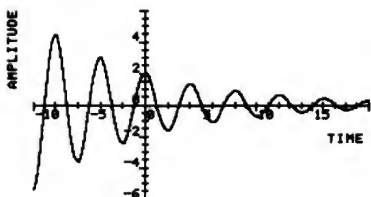
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Fudge It!

Listing 1 continued.

```

950 IF A = 73 AND B = 78 AND C = 84 THEN A = 211: GOTO
    1100
960 IF A = 65 AND B = 66 AND C = 83 THEN A = 212: GOTO
    1100
965 IF A = 82 AND B = 78 AND C = 68 THEN A = 219: GOTO
    1100
970 IF A = 83 AND B = 81 AND C = 82 THEN A = 218: GOTO
    1100
980 IF A = 76 AND B = 79 AND C = 71 THEN A = 220: GOTO
    1100
990 IF A = 69 AND B = 88 AND C = 80 THEN A = 221: GOTO
    1100
1000 IF A = 67 AND B = 79 AND C = 83 THEN A = 222: GOTO
    1100
1010 IF A = 83 AND B = 73 AND C = 78 THEN A = 223: GOTO
    1100
1020 IF A = 84 AND B = 65 AND C = 78 THEN A = 224: GOTO
    1100
1030 IF A = 65 AND B = 84 AND C = 78 THEN A = 225: GOTO
    1100
1040 GOTO 1160
1100 Q = Q + 2
1160 POKE TE,A
1170 TE = TE + 1
1180 NEXT
1190 FOR I = TE TO 16650: POKE I,32: NEXT : RETURN
4999 GET A$: PRINT CHR$(13): CALL 1002: CLEAR : CALL
    54915: GOTO 0
63990 POKE 216,0
63991 P = PEEK (222)
63992 ONERR GOTO 63990
63993 POKE 222,0
63995 IF P = 16 THEN 730
63996 IF P = 254 THEN RESUME
63999 GOTO 288
  
```

where the 221 20's, ASCII codes for spaces, come to an end.

Labelling

Once you have Function Plotter working properly, you will want to label your graphs and perhaps save them as pictures (as opposed to raw data) to be retrieved later. The program called Label (Listing 3) produces both horizontal and vertical labels and provides for the saving and retrieving. To use Label, hit reset after you've created a decent graph with Function Plotter, then type RUN LABEL and press return. Note that when you type in the Label listing

you should hit control-G (ASCII bell) within each set of quotation marks in line 63990. These are invisible in the printout.

Note also that you will need shapes with which to create these labels. To this end, I have included the ALPHNUM file (Listing 4). Its BSAVE parameters are ALPHNUM, A\$19B4,L1610. To enter ALPHNUM into your computer type CALL-151, then hit return. Now type 19B4: followed by the contents of Listing 4. The ALPHNUM file supports letters, numbers, periods, commas and these unforgettable characters: ! \$ % () : = - + ? /.

See you next time! ■

*4000.4117

```

4000- 00 0D 40 00 00 86 59 28
4008- 32 38 31 29 00 19 40 01
4010- 00 A5 AB 36 33 39 39 30
4018- 00 21 40 02 00 AB 33 30
4020- 00 0C 41 0A 00 59 D0 31
4028- CB DF 28 58 29 20 20 20
4030- 20 20 20 20 20 20 20 20
4038- 20 20 20 20 20 20 20 20
4040- 20 20 20 20 20 20 20 20
4048- 20 20 20 20 20 20 20 20
4050- 20 20 20 20 20 20 20 20
4058- 20 20 20 20 20 20 20 20
4060- 20 20 20 20 20 20 20 20
4068- 20 20 20 20 20 20 20 20
4070- 20 20 20 20 20 20 20 20
4078- 20 20 20 20 20 20 20 20
  
```

```

4080- 20 20 20 20 20 20 20 20
4088- 20 20 20 20 20 20 20 20
4090- 20 20 20 20 20 20 20 20
4098- 20 20 20 20 20 20 20 20
40A0- 20 20 20 20 20 20 20 20
40A8- 20 20 20 20 20 20 20 20
40B0- 20 20 20 20 20 20 20 20
40B8- 20 20 20 20 20 20 20 20
40C0- 20 20 20 20 20 20 20 20
40C8- 20 20 20 20 20 20 20 20
40D0- 20 20 20 20 20 20 20 20
40D8- 20 20 20 20 20 20 20 20
40E0- 20 20 20 20 20 20 20 20
40E8- 20 20 20 20 20 20 20 20
40F0- 20 20 20 20 20 20 20 20
40F8- 20 20 20 20 20 20 20 20
4100- 20 20 20 20 20 20 20 20
4108- 20 20 20 00 12 41 0F 00
4110- B1 00 9D 41 1E 00 AD 46
  
```

Listing 2. Hex listing of lines 0-10 of Function Plotter.

Fudge It!

Listing 3. Label.

```

0 POKE - 16302,0: REM THIS IS THE LABEL PROGRAM
1 ONERR GOTO 63990
2 ROT=0: SCALE=1:C=3: HCOLOR=3: POKE 230,32
3 D$ = CHR$(4)
15 PRINT D$"BLOADALPHNUM"
20 GOTO 600
40 GOSUB 62000: RETURN
220 IF LEN (A$) = 0 AND A$ < > " " THEN RETURN
221 IF A$ = " " THEN 300
222 HCOLOR=3
225 AA = ASC (A$) - 31
230 ON AA GOTO 301,302,40,40,305,306,40,40,309,310,40
,311,312,313,314,315,316,317,317,317,317,,317,
317,317,317,326,327,40,329,40,331,40
234 IF AA < 1 OR AA > 59 THEN 40
235 GOTO 333
300 IF FX = 0 OR ASC (AN$) = 32 THEN HCOLOR=0: DRAW
51 AT X,Y: HCOLOR=C: RETURN
301 XDRAW 51 AT X,Y: XDRAW 51 AT X,Y: HCOLOR=C: RETURN

302 J = 29: GOTO 359
305 J = 38: GOTO 359
306 J = 35: GOTO 359
309 J = 39: GOTO 359
310 J = 40: GOTO 359
311 J = 33: GOTO 359
312 J = 28: GOTO 359
313 J = 31: GOTO 359
314 J = 27: GOTO 359
315 J = 34: GOTO 359
316 J = 50: GOTO 359
317 J = 23 + AA: GOTO 359
326 J = 37: GOTO 359
327 J = 36: GOTO 359
329 J = 32: GOTO 359
331 J = 30: GOTO 359
333 J = AA - 33
359 IF FX = 0 THEN DRAW J AT X,Y: HCOLOR=C: RETURN

360 XDRAW J AT X,Y: HCOLOR=C: RETURN
600 TEXT : HOME : VTAB 3: INVERSE : PRINT "MENU FOR L
ABEL UTILITY": NORMAL : PRINT
601 POKE 232,180: POKE 233,25
605 HCOLOR=C: ROT=64: SCALE=1:FF=1:FX=0:FV=0
613 PRINT "(1) SEE DISK CATALOG": PRINT
614 PRINT "(2) INSERT EXTRA LABELS": PRINT
615 PRINT "(3) SAVE PICTURE TO DISK": PRINT
616 PRINT "(4) GET STORED PICTURE FROM DISK": PRINT
620 FLASH : PRINT "(1-4):": NORMAL : GET AN$: PRINT
AN$
622 PRINT CHR$(13): CALL 1002
625 Q = VAL (AN$): IF AN$ = "0" THEN PRINT D$"RUNMEN
U"
626 IF (Q < 1 OR Q > 4) THEN 600
630 ON Q GOTO 17000,30000,31000,33000
640 GOTO 600
17000 PRINT : PRINT CHR$(4):"CATALOG": GOSUB 63000:
HOME : GOTO 600
30000 GOSUB 36000
30001 AN$ = "":Z$ = "": PRINT "LABEL: ";
30002 GET Z$:AN$ = AN$ + Z$: IF ASC (Z$) = 13 THEN A
N$ = LEFT$(AN$, LEN (AN$) - 1): PRINT CHR$(13)
): CALL 1002: GOTO 30005
30003 IF ASC (Z$) < 32 THEN AN$ = LEFT$(AN$, LEN (
AN$) - 1): IF LEN (AN$) > 0 THEN AN$ = LEFT$(A
N$, LEN (AN$) - 1)
30004 PRINT Z$: GOTO 30002
30005 POKE 232,180: POKE 233,25
30010 HOME : VTAB 2: PRINT "USE PADDLES TO POSITION L
ABEL: HIT P TO PRINT LABEL": GOSUB 63000
30020 POKE - 16304,0: POKE - 16297,0: HCOLOR=3
30021 IF FV = 1 THEN ROT=16
30022 FX = 1: GOTO 30030
30024 IF FV = 1 THEN X = P0:Y = P1: FOR Q = 1 TO LEN
(AN$):A$ = MID$(AN$,Q,1): GOSUB 35000: GOSUB 22
0:Y = Y + 7: NEXT :X = P0:Y = P1: FOR Q = 1 TO LEN
(AN$):A$ = MID$(AN$,Q,1): GOSUB 35000: GOSUB 22
0:Y = Y + 7: NEXT : GOTO 30030
30025 X = P0:Y = P1: FOR Q = 1 TO LEN (AN$):A$ = MID$
(AN$,Q,1): GOSUB 35000: GOSUB 220:X = X + 7: NEXT
:X = P0:Y = P1: FOR Q = 1 TO LEN (AN$):A$ = MID$
(AN$,Q,1): GOSUB 35000: GOSUB 220:X = X + 7: NEXT
30030 P0 = 1.094 * PDL (0):P1 = .749 * PDL (1)
30035 PP = PEEK ( - 16384): IF PP > 127 THEN POKE -
16368,0: GOTO 30128
30040 GOTO 30024
30128 IF FV = 0 THEN X = P0:Y = P1: FOR Q = 1 TO LEN
(AN$):A$ = MID$(AN$,Q,1): GOSUB 35000: GOSUB 22
0:X = X + 7: NEXT : GOSUB 63010: GOTO 600

```

Listing 3 continued.

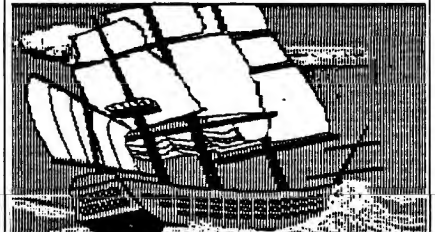
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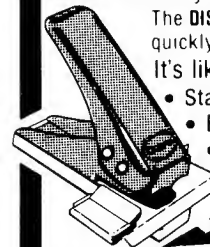
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Listing 3 continued.

```
30129 X = P0:Y = P1: FOR Q = 1 TO LEN (AN$):A$ = MID$
      (AN$,Q,1): GOSUB 35000: GOSUB 220:Y = Y + 7: NEXT
      : GOSUB 63010: GOTO 600
31000 HOME : VTAB 1: INVERSE : IF F$ = "" THEN F$ = "
      NONE"
31002 PRINT "CURRENT FILE NAME: "F$: NORMAL : PRINT
31005 PRINT : INVERSE : PRINT "HIT RETURN TO ABORT. D
      O NOT TRY TO SAVE PICTURES ON THE PROGRAM DISK.":
      NORMAL : PRINT
31010 INPUT "PICTURE NAME: ";F$: IF LEN (F$) = 0 THEN
      600
31040 PRINT CHR$ (4);"BSAVE";F$;"A8192,L$1FF8": GOTO
      600
33000 PRINT : INVERSE : PRINT "HIT RETURN TO ABORT.":
      NORMAL : PRINT
33010 INPUT "PICTURE NAME: ";F$: IF LEN (F$) = 0 THEN
      600
33040 PRINT CHR$ (4);"BLOAD";F$;"A8192": POKE - 16
      304,0: POKE - 16297,0: GOSUB 63010: GOTO 600
35000 IF X > 273 THEN X = 273
35005 IF Y > 184 THEN Y = 184
35010 RETURN
36000 HOME : VTAB 1: INVERSE : PRINT "HIT RETURN TO ABORT"
36001 NORMAL
36002 PRINT "HORIZONTAL OR VERTICAL LABEL? (H/V): ";:
      GET AZ$: PRINT AZ$: PRINT CHR$ (13): CALL 1002
36004 IF ASC (AZ$) = 13 THEN POP : GOTO 600
36005 IF ASC (AZ$) < > 86 AND ASC (AZ$) < > 72 THEN
      36000
36010 IF ASC (AZ$) = 86 THEN FV = 1
36020 RETURN
51000 GG = GG + 1: IF GG > 2 THEN GG = 0: POP : GOTO 600
51001 RETURN
62000 FOR WQ = 1 TO 15:PK = PEEK ( - 16336): NEXT : RETURN
63000 PRINT : PRINT "(HIT ANY KEY TO CONTINUE:)": PRINT
63010 PH = PEEK ( - 16384): IF PH > 127 THEN POKE -
      16368,0: RETURN
63020 GOTO 63010
63990 POKE 216,0:PQ = PEEK (222): PRINT " ": PRINT " "
      : PRINT " "
      (Note: Hit control-G within each set of quotes in line 63990.)
63991 ONERR GOTO 63990
63992 IF PQ = 254 THEN RESUME
63994 IF PQ = 6 OR PQ = 5 THEN PRINT : PRINT "FILE N
      OT FOUND! TRY AGAIN...": GOSUB 51000: PRINT CHR$
      (4);"DELETE";F$: GOTO 600
63999 C = 3: SCALE= 1: ROT= 64: GOTO 600
```

Listing 4. The ALPHNUM file.

19B0- FF FF 00 00 34 00 6A 00	1AE0- 8D 1B DF 1B 9F 49 2D 6D
19B8- 88 00 A6 00 C3 00 E1 00	1AE8- D1 DB DB 9B 00 69 49 8D
19C0- FE 00 1B 01 39 01 58 01	1AF0- 1B DF 1B 9F 09 4D 09 8D
19C8- 75 01 92 01 AE 01 CA 01	1AF8- 1B 3F 3F FF 4A 4D 09 8D
19D0- E9 01 08 02 27 02 45 02	1B00- 1B DF 1B 9F 09 4D 09 8D
19D8- 63 02 81 02 9F 02 BC 02	1B08- DB DB DB 00 49 2D 4D DA
19E0- DB 02 F8 02 17 03 34 03	1B10- 1B DF 9B 49 09 4D D1 DB
19E8- 51 03 6F 03 8B 03 A7 03	1B18- DF 9B 49 09 4D D1 DB DF
19F0- C2 03 DE 03 FA 03 16 04	1B20- 9B 49 29 6D D1 DB DB 9B
19F8- 32 04 4E 04 64 04 86 04	1B28- 00 49 29 6D DA FB DB 53
1A00- A2 04 BF 04 DB 04 F6 04	1B30- 49 09 4D DA FB DB 53 49
1A08- 13 05 30 05 4D 05 6A 05	1B38- 09 4D DA FB 1B 9F 49 2D
1A10- 87 05 A5 05 C2 05 E0 05	1B40- 4D D1 DB DB 9B 00 69 49
1A18- FE 05 1D 06 44 06 49 6D	1B48- 8D DB DF FB 4A 4D 4D D1
1A20- 89 DB DF DF 4A 4D 09 8D	1B50- DB 3B FF 4A 4D 4D D1 1B
1A28- 1B 3F 3F FF 4A 4D 09 8D	1B58- DF FB 4A 4D 09 8D DB DB
1A30- 1B DF 1B 9F 09 4D 09 8D	1B60- DB 00 69 49 89 DB DB FB
1A38- DB DB DB 00 29 2D 6D D1	1B68- 4A 4D 49 D1 DB DB 9F 09
1A40- FB 1B DF 4A 69 09 8D DB	1B70- 4D 49 D1 DB DB 9F 09 2D
1A48- 3F FF 53 09 4D 69 DA DF	1B78- 2D 6D DA DB DB 00 69 49
1A50- FB 53 29 2D 6D D1 DB DB	1B80- 8D 1B FF 3B 9F 09 0D 6D
1A58- 9B 00 09 2D 6D D1 FB DB	1B88- 8D 1B 1F FF 9F 09 4D 09
1A60- 9F 09 4D 49 D1 DB DB 9F	1B90- 8D 1B DF 1B 9F 09 4D 09
1A68- 09 4D 49 D1 FB DB 9F 49	1B98- 8D DB DB DB 00 69 49 8D
1A70- 2D 6D D1 DB DB 9B 00 29	1BA0- 1B DF 3B 9F 09 0D 4D 8D
1A78- 2D 6D D1 FB 1B DF 4A 69	1BA8- 1B 1F DF 9F 09 4D 29 8D
1A80- 09 8D 1B DF FB 53 09 4D	1BB0- 1B DF 1B 9F 09 4D 09 8D
1A88- 69 DA DF FB 53 29 2D 6D	1BB8- DB DB DB 00 09 2D 6D D1
1A90- D1 DB DB 9B 00 29 2D 2D	1BC0- FB DB 9F 09 4D 09 8D 1B
1A98- 8D DB DB FB 4A 4D 49 D1	1BC8- DF 1B 9F 09 4D 09 8D 1B
1AA0- DB 3F FF 4A 4D 49 D1 DB	1BD0- DF 1B 9F 49 2D 6D D1 DB
1AA8- DB 9F 09 2D 2D 6D DA DB	1BD8- DB 9B 00 29 2D 6D D1 FB
1AB0- DB 00 29 2D 8D DB DB	1BE0- DB 9F 09 4D 09 8D DB 3F
1AB8- FB 4A 4D 49 D1 DB 3F FF	1BE8- 3F 9F 09 4D 49 D1 DB DB
1AC0- 4A 4D 49 D1 DB DB 9F 09	1BF0- 9F 09 4D 49 D1 DB DB 9B
1AC8- 4D 49 D1 DB DB 9B 00 09	1BF8- 00 09 2D 6D D1 FB DB 9F
1AD0- 2D 6D D1 FB DB 9F 09 4D	1C00- 09 4D 09 8D 1B DF 1B 9F
1AD8- 49 D1 3B FF FB 4A 4D 09	1C08- 09 4D 0D 8D DB DF FB 4A

Listing 4 continued.

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Listing 4 continued.

1C10- 29 6D 8D DB DB DB 00 29
1C18- 2D 6D D1 FB DB 9F 09 4D
1C20- 09 8D DB 3F 3F 9F 09 4D
1C28- 4D D1 1B DF FB 4A 4D 09
1C30- 8D DB DB DB 00 09 2D 6D
1C38- D1 FB DB 9F 09 4D 49 D1
1C40- 1B 3F FF 53 49 49 8D 1B
1C48- DF 1B 9F 49 2D 6D D1 DB
1C50- DB 9B 00 09 2D 2D 8D DB
1C58- FB DB 4A 49 4D D1 DB DF
1C60- 9B 49 09 4D D1 DB DF 9B
1C68- 49 09 4D D1 DB DB 9B 00
1C70- 69 49 8D 1B DF 1B 9F 09
1C78- 4D 09 8D 1B DF 1B 9F 09
1C80- 4D 09 8D 1B DF 1B 9F 49
1C88- 2D 6D D1 DB DB 9B 00 69
1C90- 49 8D 1B DF 1B 9F 09 4D
1C98- 09 8D DB DF DF 4A 69 69
1CA0- D1 DB FF 9B 49 29 4D D1
1CA8- DB DB 9B 00 69 49 8D 1B
1CB0- DF 1B 9F 09 4D 09 8D 1B
1CB8- 1F FF 9F 09 0D 6D 8D 1B
1CC0- FF 3B 9F 09 4D 09 8D DB
1CC8- DB DB 00 69 49 8D 1B DF
1CD0- 1B 9F 49 4D 4D 4A 1B FF
1CD8- 9B 49 4D 4D 4A DF 1B 9F
1CE0- 09 4D 09 8D DB DB DB 00
1CE8- 09 4D 69 DA DF FB 53 09
1CF0- 4D 69 DA 3B FF 9B 49 09
1CF8- 4D D1 DB DF 9B 49 09 4D
1D00- D1 DB DB 9B 00 29 2D 2D
1D08- 8D 1B DF DB 53 49 09 4D
1D10- DA 1B FF 9B 49 4D 49 DA
1D18- DB 1B 9F 09 2D 2D 6D DA
1D20- DB DB 00 49 49 89 DB DB
1D28- DB 4A 49 49 D1 DB DB 9B
1D30- 49 49 49 DA 1B FF 9B 49
1D38- 29 4D D1 DB DB 9B 00 49
1D40- 49 89 DB DB DB 4A 49 49
1D48- D1 DB DB 9B 49 49 49 DA
1D50- 1B FF 9B 49 29 4D D1 DB
1D58- 3B DF 00 49 69 89 DB FB

1D60- DB 4A 49 4D D1 DB DF 9B
1D68- 49 49 49 DA DB DB 53 49
1D70- 69 89 DB DB DB 00 09 2D
1D78- 6D D1 FB DB 9F 49 49 69
1D80- DA 3B DF 9B 49 69 49 DA
1D88- DB DB 53 49 4D 89 DB DB
1D90- DB 00 49 49 89 DB DB DB
1D98- 4A 49 49 D1 3B 3F 3F 9F
1DA0- 49 49 49 DA DB DB 53 49
1DA8- 49 89 DB DB DB 00 49 49
1DB0- 89 DB DB DB 4A 2D 2D 4D
1DB8- DA DB DB 53 29 2D 6D D1
1DC0- DB DB 9B 49 49 49 DA DB
1DC8- DB 00 49 49 89 DB FB DB
1DD0- 4A 49 4D D1 3B 3F FF 53
1DD8- 49 69 89 DB FB DB 4A 49
1DE0- 49 D1 DB DB 9B 00 49 49
1DE8- 89 1B DF DB 53 49 09 4D
1DF0- DA 1B DF 9B 49 69 49 DA
1DF8- DB FB 53 69 49 89 DB DB
1E00- DB 00 49 49 89 1B DF 3B
1E08- 9F 09 6D 69 D1 DB DF 9B
1E10- 49 69 49 DA FF FB 53 69
1E18- 09 6D DA DB DB 00 49 49
1E20- 89 DB DB DB 4A 09 6D 89
1E28- DB 3B DF 53 49 49 89 DB
1E30- 3B DF 53 49 6D 89 DB 1B
1E38- FF 00 49 49 89 DB DB DB
1E40- 4A 09 6D 89 DB 3B DF 53
1E48- 49 49 89 DB 3B DF 53 49
1E50- 6D 89 DB DB DB 00 49 69
1E58- 89 1B 3F FF 9B 49 0D 4D
1E60- D1 1B 3F DF 53 49 69 8D
1E68- DB 3F FF 53 49 69 89 DB
1E70- DB DB 00 49 09 4D DA 1B
1E78- DF 9B 49 69 49 DA DB DF
1E80- 53 49 4D 89 DB FB DB 4A
1E88- 49 69 D1 DB DB 9B 00 09
1E90- 4D 49 DA DB DF 53 49 69
1E98- 89 DB FB DB 4A 49 4D D1
1EA0- DB FB 9B 49 4D 49 DA DB
1EA8- DB 00 49 69 89 DB 3B DF

1EB0- 53 09 0D 4D D1 DB DF 9B
1EB8- 49 09 4D D1 DB DF 9B 49
1EC0- 2D 2D 8D DB DB DB 00 09
1EC8- 2D 6D D1 FB DB 9F 49 49
1ED0- 69 DA 3B DF 9B 49 6D 49
1ED8- DA DB 1B 9F 09 2D 2D 6D
1EE0- DA DB DB 00 09 2D 6D D1
1EE8- FB DB 9F 49 49 69 DA 3B
1EF0- FF 9B 49 49 69 DA DF 1B
1EF8- 9F 49 2D 6D D1 DB DB 9B
1F00- 00 49 09 4D DA 3B DF 9B
1F08- 49 69 4D DA FB FB 53 29
1F10- 2D 2D 8D DB DF DB 4A 49
1F18- 69 D1 DB DB 9B 00 29 2D
1F20- 2D 8D DB DB FB 4A 2D 6D
1F28- 89 DB DF DB 4A 49 09 8D
1F30- DB DF FB 4A 29 6D 89 DB
1F38- DB DB 00 49 2D 4D DA DB
1F40- FB 53 69 49 89 DB 3F 3F
1F48- 9F 09 4D 09 8D 1B DF 1B
1F50- 9F 49 2D 6D D1 DB DB 9B
1F58- 00 29 2D 2D 8D 1B DF 1B
1F60- 9F 49 49 4D DA 1B DF 9B
1F68- 49 69 49 DA DB DF 53 49
1F70- 4D 89 DB DB DB 00 09 2D
1F78- 6D D1 FB DB 9F 09 4D 09
1F80- 8D DB 3F FF 53 69 49 8D
1F88- 1B DF 1B 9F 49 2D 6D D1
1F90- DB DB 9B 00 09 2D 6D D1
1F98- FB DB 9F 09 4D 09 8D 1B
1FA0- 3F 3F DF 4A 49 09 8D DB
1FA8- DF DB 4A 29 6D 89 DB DB
1FB0- DB 00 09 2D 6D D1 FB DB
1FB8- 9F 09 4D 29 8D 1B 1F FF
1FC0- 9F 09 6D 09 8D 1B DF 1B
1FC8- 9F 49 2D 6D D1 DB DB 9B
1FD0- 00 2D 2D 2D 3E 3F 3F 37
1FD8- 2D 2D 2D 3E 3F 3F 37 2D
1FE0- 2D 2D 3E 3F 3F 37 2D 2D
1FE8- 2D 3E 3F 3F 37 00 2D 2D
1FF0- 2D 2D 15 3F 3F 3F 3F 00
1FF8- 3C 36 2D 24 07 00 45 80

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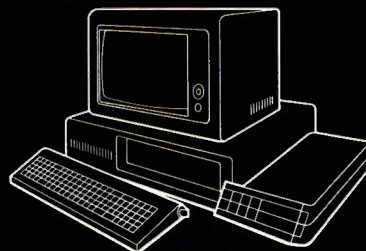
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Of Mice and Pointers

In my February and March columns, I presented some rather heady techniques and sample programs dealing with high resolution graphics. I hope you have been able to use some of these in your own programs. This month I would like to give you (and me) a breather of sorts, and expound briefly on three new technologies that are being thrust, with much ballyhoo, into the personal computer arena—the mouse, the touch sensitive screen and voice recognition. Each of these technologies offers a new, non-keyboard method for telling a computer program just what you want it to do.

Since this article reflects my personal perspective, I would appreciate letters from you relating useful applications and/or problems that you have experienced when working with these devices. If I get enough letters, I will use a future column to pass along your comments and opinions.

Of Mice and Men

Many of the computer hardware introductions in the past year have included a small device that sits quietly on the table beside the computer. This little contoured box has one to three push buttons on its surface and is connected to the computer via a long, thin tail that snakes across the table and disappears into the case. Appropriately or not, this device has been christened a *mouse*, yet another addition to the specialized vocabulary of the computerist.

The mouse is referred to as a "pointing device." The idea is that the cursor on the screen is moved up,

down or sideways by simply pushing the mouse across the desktop in the desired direction. Once the cursor has been positioned, one of the buttons on the mouse is pressed, signaling the computer program to carry out a given process or command.

The function that lends itself most to mouse control is menu selection. The screen fills with several processing options, in the form of a simple list or a variety of pictures. When the mouse-controlled cursor has been positioned next to the desired menu option and the operator presses the button, the program calculates the position of the cursor and uses that information to branch to the related processing instructions. Many "attack and destroy" arcade games use exactly this type of technique with push buttons and joysticks instead of a mouse. (The mouse is really a joystick in disguise.)

One serious drawback to having a mouse chained to your computer is the amount of clear desk space required for the device to operate efficiently. My desk is usually so cluttered next to the computer that a mouse wouldn't stand a chance. It is interesting to note that among the features manufacturers boast when comparing their products with those of their competitors is the computer's "footprint," a reference to the amount of desk space it occupies. I find an irony in advertisements that claim both a very small footprint and a mouse. The latter easily offsets much of the gain in desk space so carefully engineered by the design department.

Of Fingers and Pens

A new entry in the selection device market for inexpensive computers is the screen designed to sense an impending finger's position. This approach may be a more "natural" one than moving a mouse, and is similar in some respects to light pens which have been in use for some time.

With this device, the operator need only reach out and touch the spot on the screen corresponding to a menu option or command. As with the mouse, the program determines this location and proceeds accordingly.

Though possibly more natural, I feel that the pointing process is also flawed: I wouldn't care to spend much time reaching out over my keyboard to touch the screen. Once again, there is an irony in the manufacturers' claims. One of the really useful innovations to hit the micro-computer market is the detachable keyboard. It enables the operator to pull the keyboard away from the desk (to the extent allowed by the "umbilical" cord), slouch comfortably in an easy chair and hack away.

Any program that might call for the operator to touch the screen with a finger would require him or her to "sit upright, both feet on the floor, back straight, and pay attention!" I had an English teacher once who insisted that my English would significantly improve if I followed that

Address correspondence to Dan Bishop at Custom Comp, PO Box 429, Buena Vista, CO 81211.

prescription. I have yet to figure out that relationship, but I do like to be comfortable when working with my computer. I don't think pointing devices are for me.

One other factor may affect the acceptance of the touch sensitive devices: Pointing is not exactly associated with intelligent communication. From childhood the operative command has always been "Don't point!" Yet here we have the board chairman of a major manufacturing firm sitting in front of his computer, studying financial forecasts that may make or break his company. Occasionally he lifts his arm from the table, extends his forefinger into the air and thrusts it toward the screen. Somehow this image doesn't fit well in my mind. I think I would even rather work with a mouse.

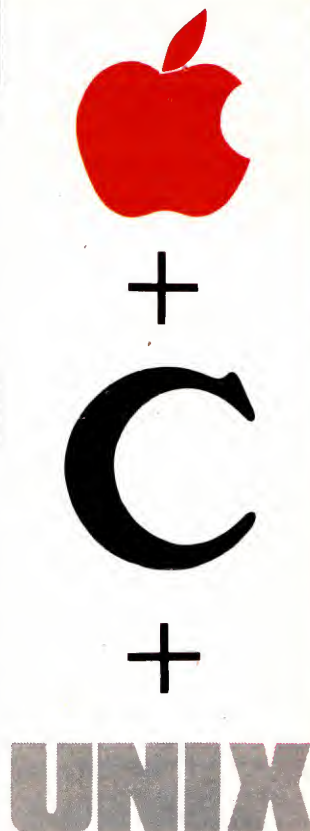
Of Voice Recognition

Voice recognition, a third method for controlling a microcomputer program without touching the keyboard, is still rather expensive. This method calls for the operator to speak certain predetermined keywords into a microphone. The program is designed to recognize these keywords and respond appropriately.

In my opinion, voice recognition is far superior to a mouse or pointing finger. It doesn't insult the intelligence of the operator, it requires no additional desk space, and the operator can be free to relax in any comfortable position.

Unfortunately, the drawbacks to voice recognition at this time are rather severe. The memory overhead is tremendous while the number of recognizable words is extremely limited. The systems I have seen require the operator to "train" the computer to recognize his or her own speech patterns for the given keywords, often limiting the system's responsiveness to a single individual.

In an environment that contains too much background noise, the system may need the keyword command repeated several times before it can make a match with the keywords stored in memory. In addition, there are many circumstances where



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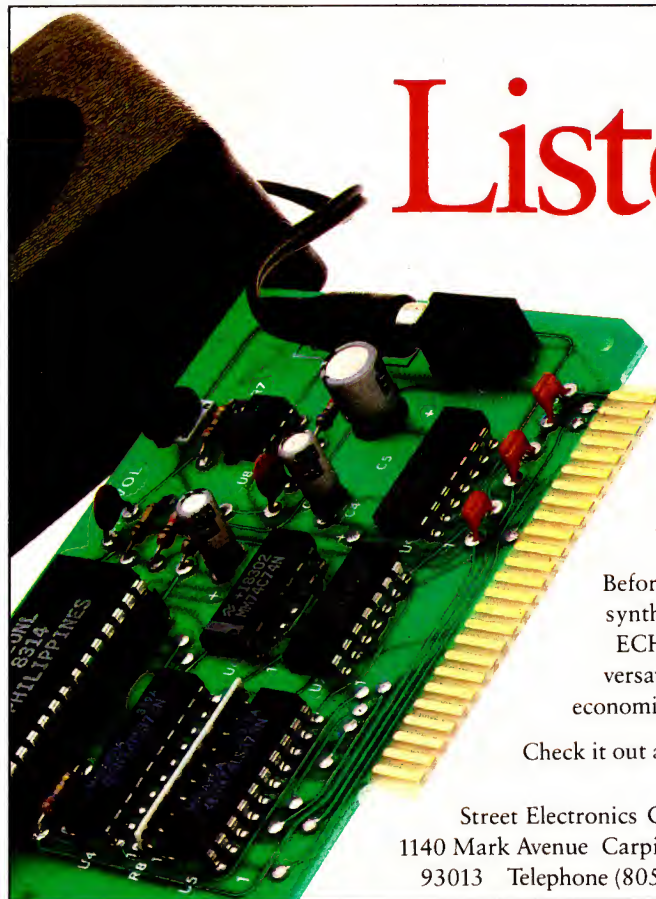
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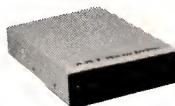
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speaking aloud to control a computer might be distracting to others. Classrooms, libraries and shared offices are examples of locations where you probably wouldn't want to be caught talking to your machine. I do a lot of late night computer work in our rather modest home, long after my wife and daughters have gone to bed. I am sure that they wouldn't care to have me mumbling away at my computer in the wee hours.

Press C to Continue . . .

From the above comments, you might think that I am simply too conservative to accept progress or adapt to change. That may or may not be true. *But I do believe that it is important to judge each new product that appears on the market in terms of its practicality and not on the basis of its novelty.* Computers are tools that can enable us to carry out many jobs more efficiently and with greater accuracy than before. I have no need for additional equipment that actually slows down their normal operation.

Indeed, how many programs have you operated that require nothing more from you than selecting prescribed answers to questions or prompts? Spreadsheets, word processors, database management programs and the like all require you to enter information using either the full keyboard or a numeric keypad. So, your hands are already on the keyboard for data entry. The fastest, most natural and most efficient way to get the computer to respond under these conditions is to press a single letter key. If you have to move your hand away from the keyboard to choose options and then reposition it over the correct keys to continue work, time and efficiency are lost.

A Brief Aside

Most persons using a computer know, or eventually come to know, the typewriter-style layout of the keyboard. The most efficient, "user friendly" programs display a list of allowed options on the screen at all times. This list may be a single line appearing at the top or bottom of the display. I have found that a maxi-



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num of eight operative commands (which may require two display lines) is the best. More than eight commands complicates the program and all too often creates confusion for the operator. Eight commands can be read at a glance, and are easily remembered from one session to the next.

When you design a program with keyboard selection of functions, be sure to relate the key to be pressed to the function desired. Simply listing the options as A, B, C or D or numbering them as 1, 2, 3 or 4 is not as useful as choosing mnemonic letters that are easily remembered, such as E for edit or D for delete. And never use these keys for any other control purpose; keep the letter E for editing and D for deleting.

You will find that following these simple rules saves hours of instructing others to use your program. Once an operator has a general idea how you have organized the program, he or she can often figure out the answers to simple questions unaided because the required responses are obvious. You will also have thinner documentation manuals.

Conclusion

Only time will tell what innovations are yet to come. Probably at least half a dozen new microcomputer techniques will appear in 1984. Most of these will represent true advances for specific applications. Few, if any, will represent an advance that will be helpful to every computer owner for every application. *It thus becomes important to evaluate new developments in both hardware and software in terms of your particular needs.* Forget that the item is the latest rage; forget the media hype. Your only considerations should be:

- 1) Will this device or program be useful to me?
- 2) Will its usefulness justify its cost?

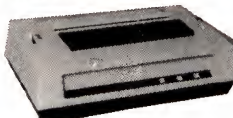
Applying these questions to the mouse, touch sensitive screen and voice recognition, I must conclude that my own computer system will be without them for a long time to come. ■

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Interaction - A Child's World

by Bill Rowland

For a change of pace, or when the real thing is not convenient, your child can build with Apple blocks.

Our latest visit to the local computer store resulted in a love affair—my six-year-old son, BJ, and Spinnaker's Face Maker. While I talked with the manager about purchasing some equipment, BJ created face after colorful face. From time to time I would hear the whistles and buzzes of his latest creation going through its crying, smiling, ear-wriggling gyrations. No doubt about it, this is an excellent program for young computer users.

Not surprisingly, on the way home my mind went through the usual debate: to buy or to make? As is often the case, "to make" won. The result is Builder, a program (see the Listing) that enables BJ to build on the hi-res screen. Builder provides him with a computerful of blocks with which to exercise his imagination.

Building with blocks has always been a favorite activity of both of my sons. A boxful of Legos, Brixblocks, woodscraps from the work room, or whatever, and they will come up with hospitals, police stations, rocket ships, space stations and even emergency medical treatment vehicles. I designed Builder to be a "just for fun" program that would satisfy their building demands and still be easy to use.

Builder provides four different shapes of blocks (square, triangular,

hexagonal and rectangular) in four different sizes (tiny, small, medium and big)—sixteen in all. In order to build, BJ must choose the type of block, size of block, and where to put it.

Building Techniques

Builder presents two lines of text at the bottom of the screen. The top line lists the four block shapes. One shape appears in inverse print, the other three in normal print. Hitting the space bar changes the shape inverted. Hitting return specifies the shape inverted as the one to be used. The second line of text consists of four commands, each activated by a single keypress: C clears the screen, S saves the picture in a special file on the disk, L loads a picture from the disk, and escape ends the program.

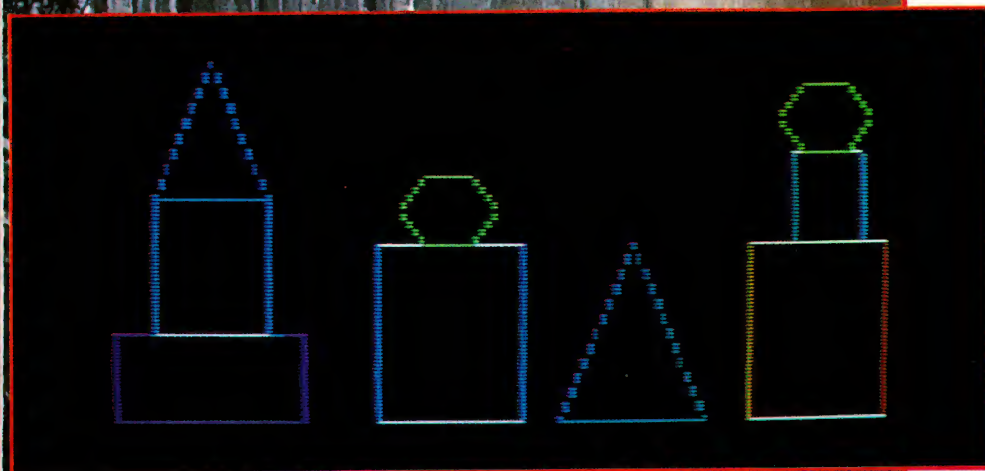
Once the block shape decision has been made, BJ is presented with a new text line for block size. Again, his choice is determined by the inverted option: He presses the space bar until the desired size is inverted and then hits return to set the block size.

His last decision is placement of the chosen block on the screen. A flashing point appears in the upper left corner of the screen. New instructions inform him that pressing one of the arrow keys, the U (up) or D (down) key will move the point. Once the point is

BU



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at the desired position, BJ presses return again and *voila!*, there's the block.

The building goes quickly and easily. The original shape decision comes immediately after the appearance of the first block on the screen. Three presses of the return key and a block is selected and placed. Again and again BJ pulls blocks from the Apple and places them on the screen. If the building isn't going well (or if Mom says "time to eat"), a tap on the C key will clean up faster than a small boy ever dreamed. Or, if BJ's not quite finished with a real masterpiece, S will save the beauty for him. He just gives it a name and, presto!, it's on the disk. After dinner, with a tap on the L key and a reminder to the Apple of the building's name, it returns just as he left it, all ready for more embellishments.

The Program's Construction

By now, most of you are saying to yourselves, "Aha, another shape table program!" Nope. Although I read Dan Bishop in these pages regularly, I chose not to go the shape table

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Photos by Frank Cordelle

route, because BJ hasn't the patience for it. Builder represents something a little different.

It works through three different plotting statements (lines 500, 510 and 520) and a random access file. You'll note the program begins by dimensioning five strings (line 5). The first string, F\$, holds the first choice in Builder—the block type. The second string, S\$, holds the second choice—the block size. The next two strings, GX\$ and GY\$, hold the plotting points for the block. The last string, R\$, holds a concatenation of the first four strings for insertion into the random access file and is the shape determiner. Note that after each choice is made it is stored for possible saving. Line 140 handles the shape choice, line 142 the size, and line 340 the plotting reference points. If saving is specified, the shape, size and points are concatenated into a

```

0 10
1 14132144
2 14132096
3 34132048
4 11132144
5 32120132
6 32144132
7 43132108
8 11132108
9 31114156
10 31150154

```

Figure 1. Sample file dump.

single eight-character string. Figure 1 provides an example.

Figure 1 is a dump of the file from a sample building run. The left column lists the record numbers within the file. (They are not included in the file itself.) Record number 0 holds the number of records in the file. Each

record is a shape determiner, as it holds all of the information necessary to create one block on the screen. The first digit in the record represents the first decision (block shape type). This number is extricated from the string and used in the ON...GOSUB in the Load routine (line 3670). The second digit is used likewise for the second ON...GOSUB encountered in lines 3800, 3850, 3900 and 3950. The last six digits are really only two numbers. Each of the reference points is transformed into a three-character string during the Save routine (line 3020 and line 3040).

Thus, the first record of our sample file shows the block is a square (1), is big (4), and is located at 132,144 on the hi-res screen. The second record is another big square located at 132,096. This third block is a hexagon (3), is big (4), and is at 132,048. Obviously, BJ placed a hexagon on a

Program listing, Builder.

```

5 DIM F$(50): DIM S$(50): DIM GX$(50): DIM
  GY$(50): DIM R$(50)
10 HIMEM: 8192
20 FOR OP = 1 TO 4: READ OP$(OP): NEXT
30 FOR CH = 1 TO 4: READ CH$(CH): NEXT
40 GOSUB 4800
50 HOME
70 SP = 6: REM LOCATOR SPEED
80 HGR: HCOLOR= 3
90 N = 0
95 POKE - 16368,0
99 REM

      BUILDING OPTIONS

100 IF N = 50 THEN HOME: VTAB 22: FLASH:
  PRINT "50 BLOCKS HAVE BEEN USED - PLEA
  SE CLEAR": NORMAL: FOR X = 1 TO 2000: NEXT
  : HOME
102 FOR OP = 1 TO 4: VTAB 21: HTAB OP * 10 -
  8: PRINT D$(OP): NEXT
105 OP = 1

110 INVERSE: VTAB 21: HTAB 2: PRINT D$(1):
  NORMAL
120 IF FLAG = 0 THEN VTAB 23: PRINT "C = C
  LR * S = SVE * L = LD * ESC = END"
130 X = PEEK ( - 16384): IF X < 127 THEN GOTO
  130
135 IF X = 155 THEN TEXT: HOME: END
138 IF X = 195 THEN GOTO 80
140 IF X = 141 AND FLAG = 0 THEN N = N + 1:
  F$(N) = STR$(OP): ON OP GOSUB 1000,13
  00,1600,1850: GOTO 100
142 IF X = 141 AND FLAG = 1 THEN S$(N) = STR$(
  OP): RETURN
144 IF X = 211 THEN GOSUB 3000: GOTO 100
148 IF X = 204 THEN GOSUB 3500: GOTO 100
150 OP = OP + 1
155 IF OP = 5 THEN POKE - 16368,0: GOTO 1
  02
160 NORMAL: VTAB 21: HTAB (OP - 1) * 10 -
  8: PRINT D$(OP - 1)

170 INVERSE: VTAB 21: HTAB OP * 10 - 8: PRINT
  D$(OP): NORMAL
180 POKE - 16368,0: GOTO 130
199 REM

      LOCATE OBJECT

200 HOME: VTAB 22: PRINT "U = ": INVERSE
  : PRINT "UP": NORMAL: PRINT " D = ":
  : INVERSE: PRINT "DOWN": NORMAL: PRINT
  " < = ": INVERSE: PRINT "LEFT": NORMAL
  : PRINT " -> = ": INVERSE: PRINT "RI
  GHT": NORMAL
202 GX = 0: GY = 0
205 POKE - 16368,0
207 FOR LL = 1 TO 2 STEP 0
210 X = PEEK ( - 16384): HCOLOR= 0: HPLOT G
  X,GY: HCOLOR= 3: HPLOT GX,GY: IF X < 12
  7 THEN GOTO 210
220 POKE - 16368,0
225 IF X = 141 THEN RETURN
230 HCOLOR= 0: HPLOT GX,GY: HCOLOR= 3
240 IF X = 149 THEN GX = GX + SP: REM RIGH
  T
250 IF X = 136 THEN GX = GX - SP: REM LEFT
260 IF X = 213 THEN GY = GY - SP: REM UP
270 IF X = 196 THEN GY = GY + SP: REM DOWN

273 IF GX > 279 THEN GX = 279
274 IF GY > 159 THEN GY = 159
275 IF GX < 0 THEN GX = 0
276 IF GY < 0 THEN GY = 0
280 NEXT
299 REM

      KEEP ON SCREEN

300 IF GX - XS < 0 THEN GX = GX + 1: GOTO 3
  00
310 IF GX + XS > 279 THEN GX = GX - 1: GOTO
  310

```

Listing continued.

System Saver® didn't become the Apple's number one selling* peripheral by being just a fan.

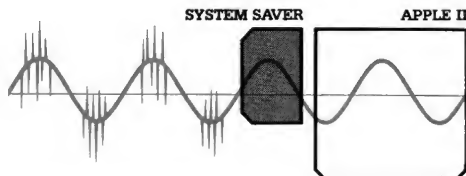
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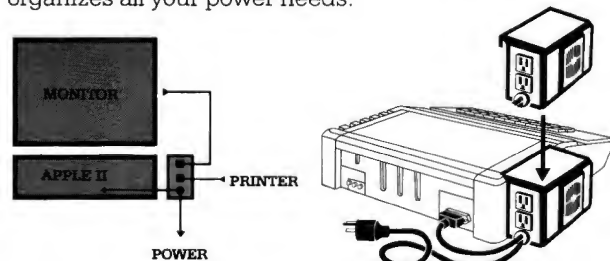
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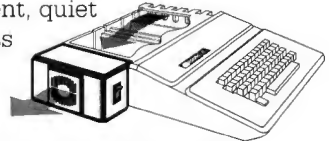


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*Softset Computer Products Hot List. **PC Magazine: March 1983.

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square on another square. The fourth record is a tiny square at 132,144, and so on.

To place the picture on the screen, all that is needed is to extract the four numbers from the string, then send them through the GOSUB procedure and on to the correct plotting statement. It is fast and painless.

Limitations

The program does have its limitations, of course. The first is in the number of blocks available for use (50). If not for the Save routine, the Apple could supply an unlimited number of blocks. The Save routine requires storing shape, size and originating points for each block. If you have a language card or an Apple IIe, try increasing the number of available blocks by revising the dimensions in line 5.

Another limitation occurs in the determination of the reference point for each block. The subroutine is called Locate Object and occupies lines 200 through 280. A point, initially plotted in the upper left corner of the screen, is moved about by presses of the arrow, U and D keys. Movement occurs by means of plotting after adding or subtracting the value of the SP variable (line 70). The larger this variable, the faster the locator point moves. However, as long as SP is greater than one, you do not have access to all of the 44,800 points on the screen. For full access you can set SP to 1, but this seems too slow for my six-year-old. The compromise of SP equals 6 works fine.

I have used REM statements to help identify each of the subroutines in Builder. Although it may appear rather lengthy, the program is actu-

ally quite simple. Most of the length comes from my attempts to make it easy for a six-year-old to use. The sixteen lines within the Building Options routine, for example, could easily have been accomplished in less than five if I had used a simple INPUT statement instead of the moving inverse. The same is true of the Locate Object subroutine.

Modifications

I have tried to make the program conducive to modification. For example, you can change the size of the blocks by simply changing the values of the variables XS and YS within the individual block subroutines. You also might want to add new blocks to the program. This will require modification of the Display subroutine, and the addition of the new block plotting statement and the new Block

Listing continued.

```

320 IF GY - YS < 0 THEN GY = GY + 1: GOTO 3
    20
340 GX$(N) = STR$(GX):GY$(N) = STR$(GY)
350 RETURN
399 REM

    SET FLAG/GET SUB

400 POKE - 16368,0: GOSUB 4850: GOSUB 100
410 POKE - 16368,0
420 GOSUB 200
430 HOME: RETURN
498 REM

    PLOT

499 REM ** SQR & RECTANGLE **
500 HPLLOT GX,GY TO GX - XS,GY TO GX - XS,GY
    - YS TO GX + XS,GY - YS TO GX + XS,GY TO
    GX,GY: RETURN
509 REM ** HEXAGON **
510 HPLLOT GX,GY TO GX - XS / 2,GY TO GX - X
    S,GY - YS / 2 TO GX - XS / 2,GY - YS TO
    GX + XS / 2,GY - YS TO GX + XS,GY - YS /
    2 TO GX + XS / 2,GY TO GX,GY
511 RETURN
519 REM ** TRIANGLE **
520 HPLLOT GX,GY TO GX - XS,GY TO GX,GY - YS
    TO GX + XS,GY TO GX,GY: RETURN
999 REM

    SQUARE

1000 GOSUB 400
1010 ON OP GOSUB 1050,1095,1140,1190
1012 GOSUB 300
1014 GOSUB 500
1020 GOSUB 4800
1030 RETURN
1049 REM

    TINY SQR & RECTANGLE

1050 XS = 6:YS = 12
1080 RETURN
1094 REM

```

```

                                SMALL SQR & RECTANGLE

1095 XS = 12:YS = 24
1100 RETURN
1139 REM

                                MEDIUM SQR & RECTANGLE

1140 XS = 18:YS = 36
1150 RETURN
1189 REM

                                BIG SQR & RECTANGLE

1190 XS = 24:YS = 48
1200 RETURN
1299 REM

                                HEXAGON

1300 GOSUB 400
1310 ON OP GOSUB 1400,1450,1500,1550
1320 GOSUB 300
1330 GOSUB 510
1340 GOSUB 4800
1350 RETURN
1399 REM

                                TINY HEX

1400 XS = 10:YS = 12
1410 RETURN
1449 REM

                                SMALL HEX

1450 XS = 16:YS = 18
1460 RETURN
1499 REM

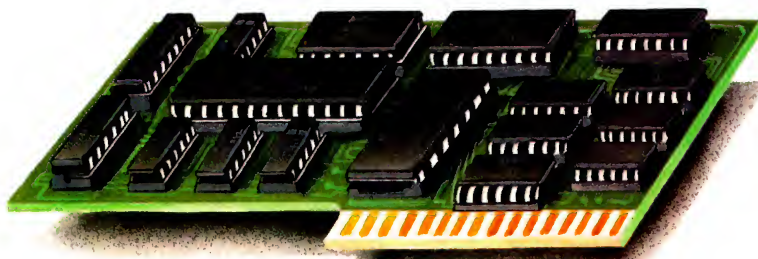
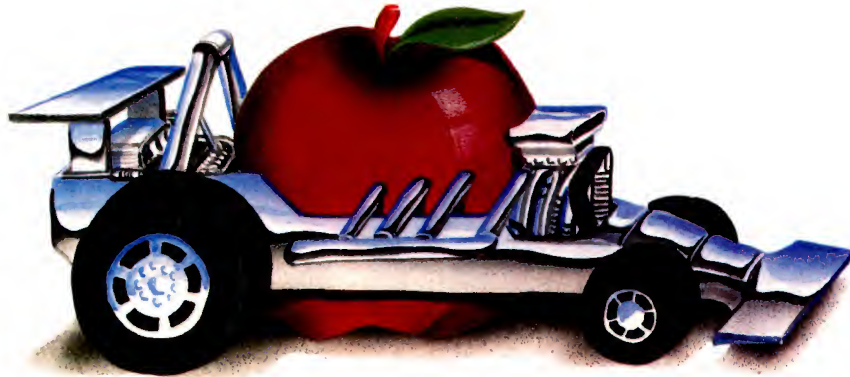
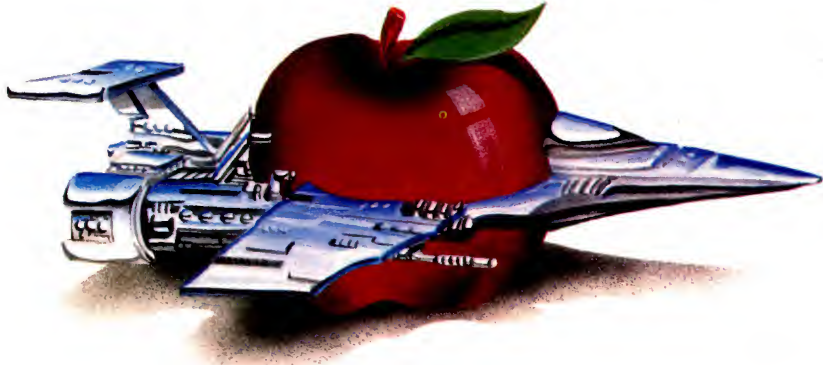
                                MEDIUM HEX

1500 XS = 22:YS = 24
1510 RETURN
1549 REM

```

Listing continued.

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subroutine. There should be plenty of room in the program to accomplish this without renumbering.

Builder has turned out to be one of BJ's favorite programs, and it was

certainly an enjoyable one for me to write. I was especially intrigued by the use of the text files to create graphics shapes. Since this is one of the first "graphics" programs I've

written, I'm sure there are many programming nuances I have yet to learn. I'll leave the enhancements and modifications to you graphics magicians out there. ■

Listing continued.

```

BIG HEX
1550 XS = 28:YS = 30
1560 RETURN
1599 REM

TRIANGLE
1600 GOSUB 400
1610 ON OP GOSUB 1050,1095,1140,1190
1612 GOSUB 300
1614 GOSUB 520
1620 GOSUB 4800
1630 RETURN
1849 REM

RECTANGLE
1850 GOSUB 400
1860 ON OP GOSUB 1900,1950,2000,2050
1862 GOSUB 300
1864 GOSUB 500
1870 GOSUB 4800
1880 RETURN
1899 REM

TINY RECTANGLE
1900 XS = 12:YS = 6
1910 RETURN
1949 REM

SMALL RECTANGLE
1950 XS = 18:YS = 12
1960 RETURN
1999 REM

MEDIUM RECTANGLE
2000 XS = 24:YS = 18
2010 RETURN
2049 REM

BIG RECTANGLE
2050 XS = 30:YS = 24
2060 RETURN
2999 REM

SAVE PICTURE
3000 FOR R = 1 TO N
3020 IF LEN (GX$(R)) < 3 THEN GX$(R) = "0"
+ GX$(R): GOTO 3020
3040 IF LEN (GY$(R)) < 3 THEN GY$(R) = "0"
+ GY$(R): GOTO 3040
3050 R$(R) = F$(R) + S$(R) + GX$(R) + GY$(R)
3060 NEXT
3070 POKE - 16368,0
3100 HOME : VTAB 22: INPUT "PICTURE NAME ";
PN$
3110 PRINT CHR$(4);"OPEN ";PN$: PRINT CHR$(4);
"DELETE ";PN$
3120 PRINT CHR$(4);"OPEN ";PN$;"L9"
3130 PRINT CHR$(4);"WRITE ";PN$;"R0"
3140 PRINT N: PRINT CHR$(4)
3150 FOR R = 1 TO N
3160 PRINT CHR$(4);"WRITE ";PN$;"R";R
3170 PRINT R$(R)
3180 NEXT
3190 PRINT CHR$(4);"CLOSE ";PN$

```

```

3200 HOME : RETURN
3399 REM

CATALOG FOR LOAD
3400 TEXT : HOME
3410 PRINT CHR$(4);"CATALOG"
3420 PRINT : INPUT "<RETURN> ";R$
3430 RETURN
3499 REM

LOAD PICTURE
3500 HGR : HCOLOR= 3
3510 ONERR GOTO 6000
3515 POKE - 16368,0
3520 HOME : VTAB 22: INPUT "PICTURE NAME ";
PN$
3530 IF PN$ = "?" THEN GOSUB 3400: GOTO 35
00
3540 PRINT CHR$(4);"OPEN ";PN$;"L9"
3550 PRINT CHR$(4);"READ ";PN$;"R0"
3560 INPUT N: PRINT CHR$(4)
3570 FOR R = 1 TO N
3580 PRINT CHR$(4);"READ ";PN$;"R";R
3590 INPUT R$(R)
3600 NEXT
3610 PRINT CHR$(4);"CLOSE ";PN$
3620 FOR R = 1 TO N
3630 FS = VAL ( LEFT$(R$(R),1))
3640 SS = VAL ( MID$(R$(R),2,1))
3650 GX = VAL ( MID$(R$(R),3,3))
3660 GY = VAL ( RIGHT$(R$(R),3))
3670 ON FS GOSUB 3800,3850,3900,3950
3680 NEXT
3690 HOME : RETURN
3800 ON SS GOSUB 1050,1095,1140,1190
3810 GOSUB 500
3820 RETURN
3850 ON SS GOSUB 1400,1450,1500,1550
3860 GOSUB 510
3870 RETURN
3900 ON SS GOSUB 1050,1095,1140,1190
3910 GOSUB 520
3920 RETURN
3950 ON SS GOSUB 1900,1950,2000,2050
3960 GOSUB 500
3970 RETURN
4799 REM

PREPARE FOR DISPLAY
4800 FOR DI = 1 TO 4:D$(DI) = OP$(DI): NEXT
4810 FLAG = 0: HOME
4820 RETURN
4850 FOR DI = 1 TO 4:D$(DI) = CH$(DI): NEXT
4860 FLAG = 1: HOME
4870 RETURN
4999 REM

DATA
5000 DATA "SQUARE","HEXAGON","TRIANGLE","R
ECTANGLE"
5010 DATA "TINY","SMALL","MEDIUM","BIG"
5999 REM

ERROR
6000 HOME : VTAB 22: PRINT "THERE HAS BEEN
AN ERROR": FOR X = 1 TO 6000: NEXT : RUN

```


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Olympic Coaching by Computer

by Ken Sheldon

The high-diver stands in mute concentration, poised for the jump that could mean a gold medal in the upcoming Olympic games. After a few seconds of intense mental preparation, she springs, arches and completes a flawless dive—right off the computer screen. The diver is a computerized stick-figure, recreating a dive made by a real championship diver hours earlier, in a technique developed by Dr. Gideon Ariel, Chairman of the Biomechanics and Computer Science committee of the US Olympic Team.

"What we have developed is the most advanced system in the world for improving athletic performance using state-of-the-art high technology," Ariel says. The system, known as "biomechanical analysis," makes use of high-speed cinematography of athletic performances, sometimes filming as many as 400 or 500 frames per second. In the laboratory, each frame of the film is "digitized," using a kind of electronic tracing device that sends the X,Y coordinates of each of the athlete's major joints to a set of Apple II

computers, the real workhorses of the system.

"The Apple is fantastic as an intelligent storage device," says Ariel. "We use Data General minicomputers to do the actual calculations on the raw data, but because the process of digitizing takes hours and hours, there is no reason to start up the minicomputers, which are very big and very power-consuming. Instead, we use the Apples to collect the information and store it on floppy disks. Then, after three or four hours of digitizing, we use a transfer program to dump the data into the minicomputer, which does the actual calculations."

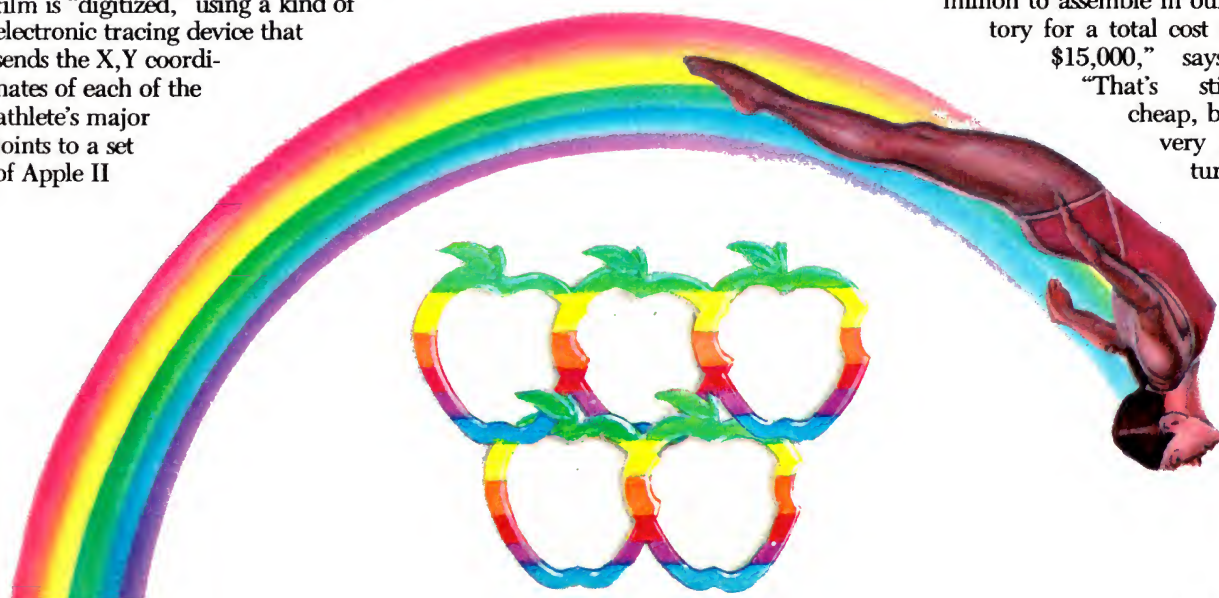
The minicomputer, a Data General Eclipse, essentially plays dot-to-dot with the data, connecting the points and creating a cartoon-like representation of the athlete's performance with the help of a \$100,000 CAD/CAM

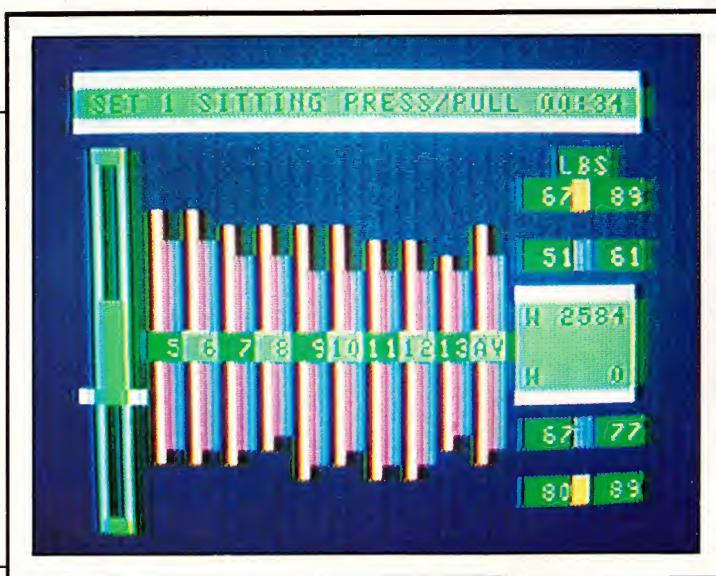
graphics system from Megatech of San Diego. "We can then use the computer's three-dimensional capabilities to rotate the image and look at it from the top, the side, or whatever angle we want," says Dr. Ariel.

The computer also performs calculations on the data that provide insights into the athlete's performance. "We can tell what the person's range of motion is, how fast he or she is moving, what is the acceleration—and based on that we can calculate the efficiency of their movements," Dr. Ariel notes that, although the eight-bit Apples do not have the power to do this kind of analysis, "I'm sure that you could do the same thing with the 32-bit Lisa or Macintosh." In fact, one of the projects that Ariel is most excited about these days is transferring his system to microcomputers. "With the advent of personal computers, we can now emulate the equipment that cost us \$2 million to assemble in our laboratory for a total cost of under

\$15,000," says Ariel.

"That's still not cheap, but in the very near future, every





serious coach or club might be able to afford such a system."

The real essence of biomechanical analysis is the system's software, written by Dr. Ariel and a dozen other people, which converts the millions of bits of raw data collected from the films into information on the velocity, acceleration and momentum of each of the athlete's joints during each phase of his or her performance—information that almost always leads to improved performance, according to Ariel. "Even though an athlete is of world-class caliber, you always find out that they have a lot of errors," he notes.

A good example of the kind of improvement possible through biomechanical analysis is 45-year-old Al Oerter, who threw the discus and won four gold medals during the 1960s. "When we contacted Oerter in 1980, people laughed because they thought he was too old to compete again," Ariel says. "We found out, however, that we could improve his technique to the point that, at the age of 45, he was throwing his best ever. In fact, the last time he was at our lab, he threw the discus over 240 feet, which is beyond the world record."

In addition to high-speed cinematography, Ariel's system also includes the use of a sophisticated "force platform" that contains thousands of weight-sensitive sensors. As athletes perform on the board, the sensors transmit information about the athlete's stance, weight placement, balance and movement to the computers. "The device is so sensitive," claims Ariel, "that I could read your pulse just from the

motion of your body as you stand on it." Such pinpoint sensitivity has led Ariel to some amazing discoveries. For example, the world's best archers are those who release their arrows between heartbeats. "They didn't even know they were doing this," Ariel says. "But it makes sense, because the body is the most stable between heartbeats and even the slightest movement can affect the course of the arrow."

Since helping to establish the US Olympic Committee's sports medicine laboratory in Colorado Springs, Dr. Ariel has opened his own private research center in Coto de Caza, California. Coaches and athletes still seek him out, and the variety of sports to which his method of biomechanical analysis has been applied seems to amaze even himself.

"We now have data in our memory banks on probably 10,000 different athletes," he says. "We've dealt with just about every kind of sport that you can imagine." Sprinters such as Evelyn Asherude, hurdlers such as Edwin Moses, high divers such as Greg Laginus, golfers, swimmers, divers, shotputters, javelin-throwers, and even figure skaters have been helped by his methods. "We found, for example, that if a figure skater's trunk is wobbling, he or she will usually receive a lower score," Ariel says. "If the trunk is stable, the performance appears more pleasing to the eye. So, this becomes something for the coach and the skater to work on."

Individual athletes are not the only ones who have been helped by Dr. Ariel. The most recent beneficiaries of

his expertise are the members of the US women's volleyball team. "When we started with them, they were about 50th in the world," Ariel says. "But we have developed a technique that can detect all kinds of trends in the play of the opposing teams. What we did was to analyze high-speed films of teams like the Chinese, Japanese and Bulgarians in championship matches such as the World Cup and other international meets." By computer analysis of the other teams, Ariel has been able to predict within one or two feet where their players will be at any given time—and, more importantly, where they will not be, in the event of a spiked volleyball in that part of the court. The result, according to Ariel, is that the US players are now beating teams that they couldn't before. "It's like playing poker with somebody when you know all the cards that they have," he says.

Nor are humans the only ones that Ariel has helped with his system. "We have worked with some very famous racehorses, the most famous of which was Spectacular Bid," says Ariel, although he notes that the horses and owners that have benefited most from his work are those with less-than-spectacular performances. "You can make more money betting on bad horses, since the odds on a bad horse are much better than the odds on a good horse. If you can train a bad horse to do well two or three times—well, some of the owners made millions of dollars on

Ken Sheldon is the news editor for jr. magazine. Write to him at 80 Pine St., Peterborough, NH 03458.



An athlete tests his isometric grip with Gideon Ariel's computerized exercise machine.



Digitized information on the locations of Olympic volleyball players could net them victories in future meets.

those ventures," he notes. He adds that the beauty of working with horses rather than human athletes is that "they don't talk back."

Dr. Ariel's work has a lighter side. "We worked with one MIT student who wanted to break the world record in throwing the Frisbee," he recalls. "He was crazy about the Frisbee." Ariel's team did an analysis of the student's repertoire of throwing styles and, sure enough, the ambitious Frisbee tosser did indeed go on to break the world record.

Gideon Ariel was an Olympic contender himself, tossing the discus in the 1960 and 1964 Olympics. That, along with a Ph.D. in computer science, led

him to, as he puts it, "combine Rocky with Star Wars," and pioneer the science of biomechanical analysis.

One of Ariel's first moneymakers was the principle behind the popular universal gym. "I patented the variable resistance mechanism, which was very profitable for us, since we got royalties from every universal gym machine in the world," he says. Later, Ariel helped with the development of the Nautilus weight-training machines, at which point he began to realize that, in the future, exercise machines would be computer-dependent, rather than gravity-dependent as in the past. At Coto de Caza, Ariel's team developed what he calls the next gen-

eration in exercise equipment, the computerized exercise machine. "There are no weights in it at all," he explains. "The resistance is supplied by a hydraulic mechanism that is controlled by computer." The system, which is built around a Motorola 6509 microprocessor, senses the motion of the person exercising and decides the optimum amount of resistance to provide in order to reach certain levels of achievement. Not only have a number of professional sports teams such as the Dallas Cowboys, the New England Patriots and the Denver Broncos purchased Ariel's computerized exercise machines, but they are finding widespread usage in hospitals and research



Charles Atlas meets Buck Rogers in Dr. Ariel's computerized exercise machine.



After performing sophisticated calculations on information fed from the digitizer, Ariel's system produces animated graphic images such as this one of a hurdler in action.

centers such as the Harvard Medical School, where they are proving to be ideal for rehabilitation work with the handicapped and those recovering from surgery or accidents.

These days, Ariel's team is turning its sights to a host of new and commercial projects, such as using computers to design the perfect tennis racket or golf club. Another project involves an inflatable shoe. "We think that, in the future, running shoes, as in the tire industry, will be inflatable," he says. "With an inflatable shoe, you can make it fit the foot exactly, using little air bladders that you inflate." Sound crazy? Not to the Japanese company that for a few years paid Ariel royalties not to make the shoes, for fear of what it would do to their business, nor to the major manufacturer of athletic shoes with which he now has a confidential contract to develop the shoes.

And if inflatable shoes are not futuristic enough, imagine this: Ariel hopes to use laser technology to project holograms of athletes in action. "Let's say we want our women's volleyball team to play against the Chinese team. There is no reason why we couldn't create a holographic representation of that team and actually have our team 'play' against them," says Ariel.

Such are the kinds of dreams that keep things hopping at Gideon Ariel's laboratory. For now, however, he is most excited about transferring his method of digitized biomechanical analysis to personal computers. "In the future, every coach will be able to have a microcomputer on his desk to analyze his team," he says. "And someday, parents may even be able to have this kind of system at home and be able to do digitization right from their televisions. Then they will be able to tell whether their children are cut out to be basketball players, sprinters, or even piano players." And why not? Olympic contenders are starting to train younger and younger these days. Why not begin at home, with the help of Mom, Dad, and the newest members of the family—a home computer, a high-speed digitizer and a force platform or two?

Dr. Ariel, where were you when I was trying to learn how to play basketball? ■

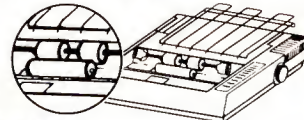
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SOFTBALL

by Norman C. Frost

Play softball in Fairbanks, Alaska? You bet! The long, long winter eventually turns into a long summer with days twenty-four hours long. Given a clear day, you could play for

all twenty-four hours, hampered by only a short period of twilight.

Last summer, I decided to keep accurate statistics on how the players on my team were doing. Compiling and

publishing the stats served several purposes, not the least of which was putting my Apple to work. I got tired of listening to people tell me how well they were doing, and that they should play all the time. Publishing statistics helped stop all the complaining. Plus, accurate stats helped me make decisions on things like batting order, when to play a weak hitter but strong fielder, and so on. They also kept the interest high among the players. Everyone likes to see how they are doing.

Let's go through the Softball Statistics program to see how it works.

1. The program will ask you if you

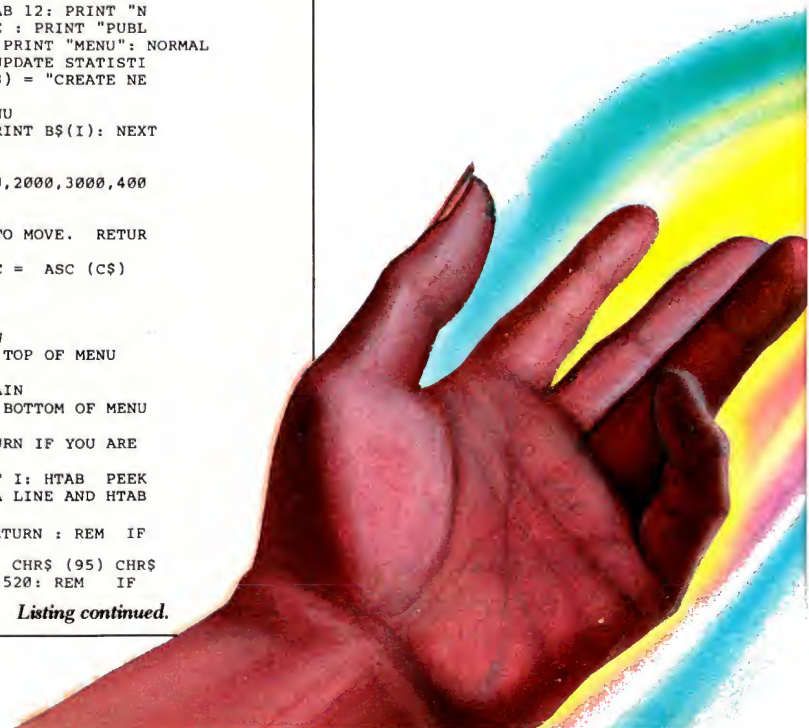
Program listing, Softball Statistics.

```

10 TEXT : HOME : CLEAR
20 LN = 25:DS = CHR$(4): DEF FN A(X) = INT (X * (10 ^ 3)
  ) + .5) * (10 ^ (- 3)): REM LN IS LENGTH OF NAME/DS
  IS DOS COMMAND/FUNCTION ROUNDS OFF NUMBERS TO 3 PLACES
30 GOSUB 500:FILES = AS: IF FILES = "" THEN 100
40 PRINT : GOSUB 11000
50 GOTO 100
60 FOR I = 1 TO 39: INVERSE : PRINT AS:; NEXT I: RETURN
70 FOR I = 1 TO 6: HTAB 1: PRINT AS:; NEXT I: NORMAL : RETURN
80 AS = " ": GOSUB 60:H = 1: VTAB 2: GOSUB 70: GOSUB 60: VTAB
  2:H = 39: GOSUB 70: RETURN
100 TEXT : HOME : GOSUB 80: VTAB 4: HTAB 10: PRINT "SOFTBA
  LL STATISTICS": HTAB 19: PRINT "BY": HTAB 12: PRINT "N
  ORMAN C. FROST": VTAB 8: HTAB 8: INVERSE : PRINT "PUBL
  ISHED IN INCIDER XX": VTAB 10: HTAB 18: PRINT "MENU": NORMAL
110 BS(0) = "ENTER PLAYERS' NAMES":BS(1) = "UPDATE STATISTI
  CS":BS(2) = "PRINT TEAM STATISTICS":BS(3) = "CREATE NE
  W FILES":BS(4) = "END"
120 X = 12:V = 16: REM TOP AND BOTTOM OF MENU
130 FOR I = 0 TO 4: VTAB 12 + I: HTAB 12: PRINT BS(I): NEXT
  I
140 GOSUB 380
150 TEXT : HOME :A = X - 11: ON A GOSUB 1000,2000,3000,400
  0,5000
160 GOTO 100
380 PRINT : VTAB 22: HTAB 5: PRINT "ARROWS TO MOVE. RETUR
  N TO SELECT"
390 VTAB X: HTAB 7: PRINT "----> ": GET CS:C = ASC (CS)
400 IF C = 8 THEN 430: REM LEFT ARROW
410 IF C = 21 THEN 460: REM RIGHT ARROW
420 IF C = 13 THEN RETURN : REM RETURN
430 HTAB 7: PRINT " ": REM ERASE ARROW
440 IF X = 12 THEN X = V: GOTO 390: REM AT TOP OF MENU
450 X = X - 1: GOTO 390: REM IF NOT MOVE UP
460 HTAB 7: PRINT " ": REM ERASE IT AGAIN
470 IF X = V THEN X = 12: GOTO 390: REM AT BOTTOM OF MENU
480 X = X + 1: GOTO 390: REM MOVE DOWN
500 VTAB 12: PRINT "ENTER NAME OF FILE (RETURN IF YOU ARE
  STARTING A NEW FILE)": PRINT
510 FOR I = 1 TO LN: PRINT CHR$(95):; NEXT I: HTAB PEEK
  (36) + 1 - LN:AS = "":I = 0: REM DRAW A LINE AND HTAB
  TO BEGINNING OF IT
520 GET CS:C = ASC (CS): IF C = 13 THEN RETURN : REM IF
  RETURN THEN RETURN
530 IF C = 8 AND I > 1 THEN PRINT CHR$(8) CHR$(95) CHR$
  (8):;I = I - 1:AS = LEFT$(AS,I): GOTO 520: REM IF

```

Listing continued.



STATISTICS

Boost your team's performance and the players' morale with this handy record-keeping utility.

have a file created already. If not, simply press return. If so, enter the file name (DOS legal names!).

2. Next, the menu will appear. If you are starting a new file, make that choice and answer the questions. Make sure you enter an even number for the number of players on your team.

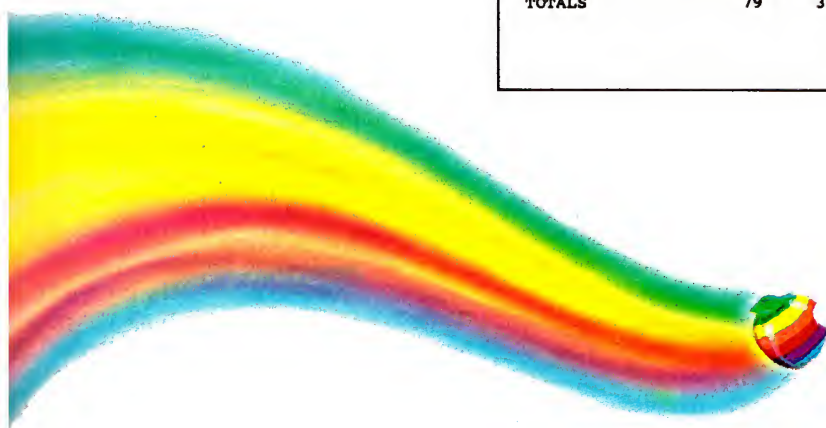
3. After you have a file created, you will want to enter the players' names. Make that choice and follow the instructions. When you are done, your

Address your correspondence to Norman Frost at 5253-G Broadway, Eielson AFB, AK 99702.

		TEST										
	NAME	AB	HT	1B	2B	3B	HR	RBI	BAVG	FAT	ER	FAVG
DAD		9	8	2	2	2	2	12	.889	15	0	1
DAVE		4	3	1	1	0	1	9	.75	5	3	.4
CHRIS		8	5	1	2	0	2	4	.625	9	2	.778
NORMAN		5	3	1	1	0	1	3	.6	9	1	.889
SAM		8	4	1	1	1	1	2	.5	2	0	1
CINDY		7	3	2	1	0	0	1	.429	5	1	.8
LYNDA		14	5	4	1	0	0	5	.357	12	3	.75
JOE		12	4	2	1	1	0	3	.333	10	1	.9
BOJO		12	3	1	0	0	2	8	.25	12	1	.917
BRAD		0	0	0	0	0	0	0	0	0	0	0
TOTALS		79	38	15	10	4	9	47	.481	79	12	.848

Figure. Sample printout.

Figure. Sample printout.





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IC

Listing continued.

```

BACK SPACE AND NOT 1ST CHAR DO IT AND CORRECT AS
540 IF C = 8 AND I = 1 THEN PRINT CHR$(8);: GOTO 510: REM
    IF AT 2ND LETTER JUST BACK UP
550 IF C < 65 AND I = 0 THEN 590: REM ILLEGAL CHAR IN 1ST
    SPACE
560 IF C = 44 OR C = 59 OR C = 34 THEN 590: REM NO QUOTE
    COMMA OR SEMICOLONS ALLOWED
570 IF C > 31 AND I < LN THEN PRINT C$;: AS = AS + C$; I =
    I + 1: GOTO 520: REM GOOD INPUT SO BUILD THE NAME
590 PRINT CHR$(7);: GOTO 520
1000 REM **ENTER NEW NAMES**
1010 AB = 0: HIT = 0: B1 = 0: B2 = 0: B3 = 0: B4 = 0: RBI = 0: FA =
    0: ERS = 0
1020 GOSUB 1800: REM **DISPLAY NAMES**
1030 PRINT : PRINT "ENTER NAME: ";: LN = 20: GOSUB 510: NM$ =
    AS
1040 IF NM$ = "" THEN GOTO 1500
1050 IF LEN(NM$) > 20 THEN 1030
1060 FOR I = 0 TO R - 1: IF NAME$(I) = "" THEN NAME$(I) =
    NM$: HOME : VTAB 10: PRINT "CREATING A FILE FOR "; NAME
    $(I): RN = I: GOSUB 12500: HOME : GOTO 1000
1070 NEXT : GOTO 1000
1500 PRINT CHR$(7): INPUT "ANY CHANGES (Y/N): "; AN$: IF
    LEFT$(AN$, 1) = "N" THEN GOSUB 12000: RETURN
1510 GOSUB 1800: PRINT : INPUT "ENTER NUMBER OF PLAYER: ";
    N: INPUT "ENTER NEW NAME: "; NAME$(N - 1): RN = N - 1: GOSUB
    12500: GOTO 1000
1800 HOME : FOR I = 0 TO R - 1 STEP 2: PRINT I + 1. " NAME
    $(I);: HTAB 19: PRINT I + 2. " NAME$(I + 1): NEXT : RETURN
2000 REM **SELECT PLAYER TO UPDATE STATS**
2010 GOSUB 1800: PRINT : INPUT "SELECT PLAYER (0 TO EXIT):
    "; AS: RN = VAL(AS): IF RN = 0 THEN RETURN
2020 HOME : VTAB 10: HTAB 5: PRINT "NOW SELECTING THE RECO
    RD": RN = RN - 1: GOSUB 11500: REM **TO GET DATA**
2030 HOME : GOSUB 2090: REM **TO DISPLAY CURRENT STATS**
2040 GOSUB 2800: REM **TO ENTER NEW DATA**
2050 GOSUB 2600: REM **TO CALCULATE NEW TOTALS**
2060 GOSUB 2090: PRINT : INPUT "PRESS RETURN TO CONT. ";: RT
    $: REM **DISPLAYS NEW TOTALS**
2070 GOSUB 12500: REM **TO WRITE NEW STATS TO DISK**
2080 TEXT : HOME : GOTO 2000
2090 TEXT : HOME : VTAB 2: HTAB (40 - LEN(NAME$(RN))) /
    2: INVERSE : PRINT NAME$(RN): NORMAL
2100 PRINT : PRINT " AB HT 1B 2B 3B HR RBI BAVG FAT ER FAV
    G"
2110 PRINT AB; TAB(5); HIT; TAB(8); B1; TAB(11); B2; TAB(
    14); B3; TAB(17); B4; TAB(20); RBI;: GOSUB 2700: PRINT
    TAB(24); AVG; TAB(29); FA; TAB(33); ERS;: GOSUB 2720:
    PRINT TAB(36); AVG
2120 RETURN
2600 AB = AB + NAB: HIT = HIT + NHITS: B1 = B1 + N1B: B2 = B2 +
    N2B: B3 = B3 + N3B: B4 = B4 + N4B: RBI = RBI + NRBI: FA =
    FA + NFA: ERS = ERS + NERS
2610 RETURN
2700 IF AB = < 0 THEN AVG = 0: RETURN
2710 AVG = FN A(HITS / AB): RETURN
2720 IF FA = < 0 THEN AVG = 0: RETURN
2730 AVG = 1 - FN A(ERS / FA): RETURN
2800 POKE 34, 10: HOME
2802 HOME : VTAB 15: INPUT "AT BATS: "; ST$: NAB = VAL(ST$)
2804 IF CHANGE = 1 THEN RETURN

```

Listing continued.

file for each player (random records) will be created and your sequential text file for names will be updated.

4. Next you will want to enter the statistics for your players. Select that option and follow the steps. If you start in the middle of the season, you can enter all the stats up to the last game. Then just enter the stats for each game as you play. The program will give you a chance to change any errors. There is no checking to see if the total hits equal the total singles, doubles and so on. You have to do that yourself. (You could even add it to the program.)

5. Prior to quitting, you will probably want to print your team's statistics. The printer is expected to be in slot 1. Each record will be read and the batting average will be placed in an array, then sorted. You should get a nicely formatted record that you can publish, if you so desire. See the Figure for an example. You can also display the stats

to the screen if you want to check them prior to printing.

6. Finally, when you exit, all the file will close.

See Table 1 for the high points of the program listing and Table 2 for a list of variables, in case you want to modify the program.

That's it. It is not too complicated but it worked very well for me last year. It certainly can be used to keep track of an entire league just by rerunning the program. Or, if you want you can add a few lines and simply loop through your league.

If you have not worked much with random files, this application should convince you how nice they are. Don't be surprised when the stats do not get written back immediately for each player as you update his/her statistics. The buffer is not full and our amazing (if simple) DOS will take care of everything. ■

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```

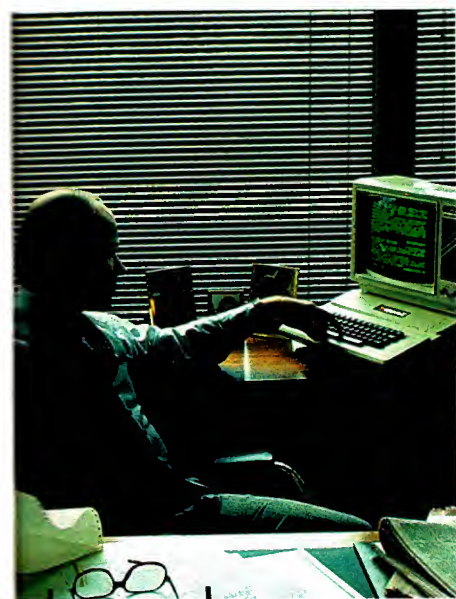
2806 HOME : VTAB 15: INPUT "HITS: ";ST$:NHITS = VAL (ST$)
2808 IF CHANGE = 1 THEN RETURN
2810 HOME : VTAB 15: INPUT "SINGLES: ";ST$:N1B = VAL (ST$)
2812 IF CHANGE = 1 THEN RETURN
2814 HOME : VTAB 15: INPUT "DOUBLES: ";ST$:N2B = VAL (ST$)
2816 IF CHANGE = 1 THEN RETURN
2818 HOME : VTAB 15: INPUT "TRIPLES: ";ST$:N3B = VAL (ST$)
2820 IF CHANGE = 1 THEN RETURN
2822 HOME : VTAB 15: INPUT "HOME RUNS: ";ST$:N4B = VAL (ST$)
2824 IF CHANGE = 1 THEN RETURN
2826 HOME : VTAB 15: INPUT "RUNS BATTED IN: ";ST$:NRBI = VAL (ST$)
2828 IF CHANGE = 1 THEN RETURN
2830 HOME : VTAB 15: INPUT "FIELDING ATTEMPTS: ";ST$:NFA = VAL (ST$)
2832 IF CHANGE = 1 THEN RETURN
2834 HOME : VTAB 15: INPUT "ERRORS: ";ST$:NERS = VAL (ST$)
2836 IF CHANGE = 1 THEN RETURN
2900 HOME : VTAB 11:CHANGE = 0
2910 PRINT "1. AB BATS = ";NAB: PRINT "2. HITS = ";NHITS: PRINT "3. SINGLES = ";N1B: PRINT "4. DOUBLES = ";N2B: PRINT "5. TRIPLES = ";N3B: PRINT "6. HOME RUNS = ";N4B
2920 PRINT "7. RUNS BATTED IN = ";NRBI: PRINT "8. FIELDING ATTEMPTS = ";NFA: PRINT "9. ERRORS = ";NERS
2930 VTAB 23: INPUT "ANY CHANGES (Y/N): ";ANS$: IF LEFT$(ANS$,1) = "N" THEN RETURN
2940 VTAB 23: CALL - 868: INPUT "ENTER NR OF ITEM: ";NR: HOME :CHANGE = 1: ON NR GOSUB 2802,2806,2810,2814,2818,2822,2826,2830,2834: GOTO 2900
3000 REM **PRINT TEAM STATS**
3010 GOSUB 3960: REM **ZEROIZE TOTALS**
3020 VTAB 2: INPUT "SCREEN (0) OR PRINTER (1): ";DVICE:DVICE = DVICE + 1
3030 HOME : ON DVICE GOSUB 3100,3600
3040 RETURN
3100 REM **TOTALS ON SCREEN**
3110 IF SRT = 1 THEN 3130
3120 VTAB 10: HTAB 15: FLASH : PRINT "SORTING": NORMAL : GOSUB 15000:SRT = 1: HOME
3130 PRINT : PRINT " AB HT 1B 2B 3B HR RBI BAVG FAT ER FAVG"
3140 FOR I = 0 TO R - 1: IF NAME$(I) = "" THEN 3220
3150 RN = SEQ(I)
3160 GOSUB 11500
3170 INVERSE : PRINT NAME$(RN): NORMAL
3180 TA = TA + AB:THIT = THIT + HIT:T1B = T1B + B1:T2B = T2B + B2:T3B = T3B + B3:T4B = T4B + B4:TRBI = TRBI + RBITFA = TFA + FA:TERS = TERS + ERS
3190 GOSUB 2700: GOSUB 2720: REM **GET AVERAGES**
3200 GOSUB 2110
3210 CV = PEEK (37): IF CV > 21 THEN POKE - 16368,0: WAIT - 16384,128: HOME
3220 NEXT
3230 FOR I = 0 TO 39: PRINT "-";: NEXT : PRINT
3240 GOSUB 3900: REM **PRINT TOTALS**
3250 CV = PEEK (37): IF CV > 21 THEN PRINT
3260 POKE - 16368,0: PRINT : INPUT "PRESS RETURN TO CONTINUE";RT$: RETURN
3600 REM **TOTAL ON PRINTER**
3610 IF SRT = 1 THEN 3650
3620 VTAB 10: HTAB 15: FLASH : PRINT "SORTING": NORMAL
3630 HOME : VTAB 10: HTAB 13: INVERSE : PRINT CHR$(7)"NO W PRINTING": NORMAL
3640 GOSUB 15000:SRT = 1
3650 PRINT D$"PR#1"
3655 POKE 36,(79 - LEN (FILES)) / 2: PRINT FILES
3660 PRINT : PRINT " NAME AB HT 1B 2B 3B HR RBI BAVG FAT ER FAVG"
3670 FOR I = 0 TO R - 1: IF NAME$(I) = "" THEN 3760
3680 RN = SEQ(I)
3690 GOSUB 11500
3700 PRINT NAME$(RN);
3710 POKE 36,21: PRINT AB;: POKE 36,28: PRINT HIT;: POKE 36,33: PRINT B1;: POKE 36,38: PRINT B2;: POKE 36,42: PRINT B3;: POKE 36,47: PRINT B4;: POKE 36,51: PRINT RBI;
3720 GOSUB 2700: POKE 36,57: PRINT AVG;: POKE 36,65: PRINT FAVG;: POKE 36,71: PRINT ERS;: GOSUB 2720: POKE 36,75: PRINT AVG
3730 TA = TA + AB:THIT = THIT + HIT:T1B = T1B + B1:T2B = T2B + B2:T3B = T3B + B3:T4B = T4B + B4:TRBI = TRBI + RBITFA = TFA + FA:TERS = TERS + ERS;
3740 PRINT
3750 NEXT
3760 FOR I = 0 TO 79: PRINT "-";: NEXT : PRINT
3770 PRINT "TOTALS";: GOTO 3920
3900 PRINT TA; TAB (5);THIT; TAB (8);T1B; TAB (11);T2B; TAB (14);T3B; TAB (17);T4B; TAB (20);TRBI;
3901 IF TA = 0 THEN AVG = 0: GOTO 3903
3902 AVG = FN A(THIT / TA)
3903 PRINT TAB (24);AVG; TAB (29);TFA; TAB (33);TERS;
3904 IF TFA = 0 THEN AVG = 0: GOTO 3906
3905 AVG = 1 - FN A(TERS / TFA)
3906 PRINT TAB (36);AVG
3910 RETURN
3920 POKE 36,21: PRINT TA;: POKE 36,28: PRINT THIT;: POKE 36,33: PRINT T1B;: POKE 36,38: PRINT T2B;: POKE 36,42: PRINT T3B;: POKE 36,47: PRINT T4B;: POKE 36,51: PRINT TRBI;

```

Listing continued.

HayesTM Your Apple's telephone.

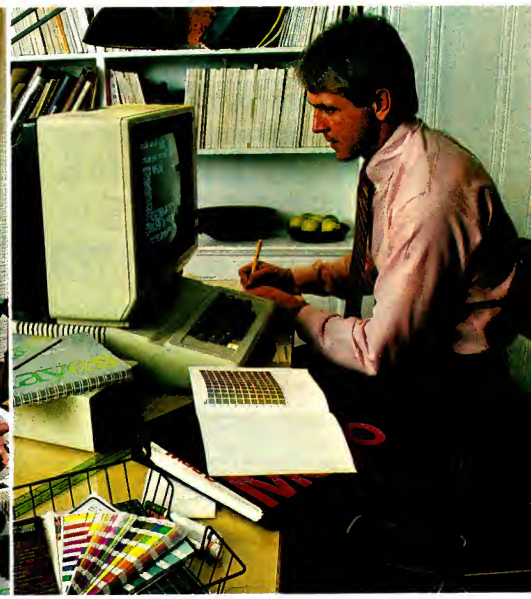
Circle 51 on Reader Service card.



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"Attn. Prod., Sales, Purch.: Recommend 50% blue, 30% red screen for closest match!"

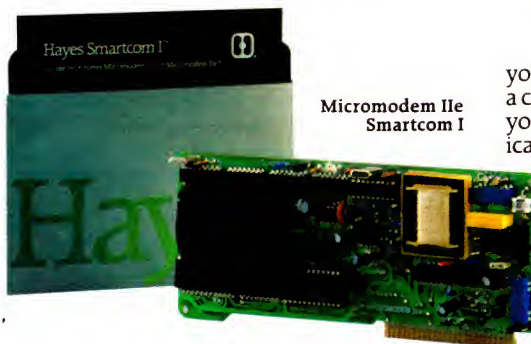
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20

The variable LN is the number of characters allowed (file or name). The function rounds off the averages.

60-100

Puts the title with borders on the screen.

400-490

Creates the little arrow for menu selection and uses it to select your option. Return selects, the arrow keys move it.

500-590

Sets up the entry of file names and player names. Since the same routine is used for both, certain characters are not allowed (comma, semicolon, quotes and a number in the first space).

1000-1070

Lets you input the names for your players and change them if you want.

1800

Formats the display of the names already entered.

2000-2080

All the subroutines for reading, displaying, entering and saving the stats are referenced here.

2090-2120

Displays the player's name and the stats for him/her.

2600-2610

Adds all the new stats to update the record.

2700-2730

Calculates the averages (batting and fielding).

2800-2836

Inputs for the last game.

2900-2940

Displays your latest inputs and then lets you change an item if you want. It then jumps back to 2600 which calculates the new totals and displays them prior to writing back to the disk.

3000-3040

Lets you select where you want the stats printed.

3100-3260

Displays the stats on the screen and totals them for you. Press any key to continue the display.

3600-3770

Prints the stats to the printer.

3900-3950

Formats the totals for printing on the screen or printer.

3960

Nulls the totals so they will not be added twice if you select display first, then print.

4000-4130

Creates first the sequential file for your names and then the random data file for the stats.

5000-5020

Closes the open files and ends.

11000-11070

Opens and reads your names file.

11500-11540

Opens the random file and reads the stats for the player you want.

12000-12065

Writes the sequential text file that has your names in it. R is the number of players you indicated are on the team.

12500-12560

Writes the stats to the individual record.

15000-15060

Sets up the sort index and then reads each average into an array for sorting.

15100-15190

A simple bubble sort that sorts the index based on average.

Table 1. Program segments and their functions.

Listing continued.

```

3930 IF TA = 0 THEN AVG = 0: GOTO 3932
3931 AVG = FN A(THIT / TA)
3932 POKE 36,57: PRINT AVG: POKE 36,65: PRINT TFA: POKE
36,71: PRINT TERS:
3933 IF TFA = 0 THEN AVG = 0: GOTO 3935
3934 AVG = 1 - FN A(TERS / TFA)
3935 POKE 36,75: PRINT AVG
3940 PRINT D$ "PR#0"
3950 RETURN
3960 TA = 0: THIT = 0: T1B = 0: T2B = 0: T3B = 0: T4B = 0: TRBI =
0: TFA = 0: TERS = 0:
3970 RETURN
4000 REM **CREATE NEW FILE**
4010 VTB 5: INPUT "HOW MANY PLAYERS MAX? (EVEN NUMBERS ON
LY) ": R: GOSUB 4500
4020 PRINT : PRINT "ENTER THE NAME OF YOUR FILE: ": PRINT
: GOSUB 510: FILE$ = A$: PRINT
4030 PRINT D$ "OPEN "; FILE$: ".NAMES"
4040 PRINT D$ "DELETE "FILE$ ".NAMES"
4050 PRINT D$ "OPEN "FILE$ ".NAMES"
4060 PRINT D$ "WRITE "FILE$ ".NAMES"
4070 PRINT R
4080 FOR I = 0 TO R - 1: PRINT NAME$(I): NEXT I
4090 PRINT D$ "OPEN "FILE$ ".DATA, L45"
4100 PRINT D$ "DELETE "FILE$ ".DATA"
4110 PRINT D$ "OPEN "FILE$ ".DATA, L45"
4120 PRINT D$ "CLOSE "FILE$ ".NAMES"
4130 RETURN
4500 REM
DIMENSION VARIABLES
4510 DIM NAME$(R - 1), AVG(R - 1), SEQ(R - 1): RETURN
5000 REM **CLOSE AND END **
5010 PRINT : PRINT D$ "CLOSE"
5020 END
11000 REM **OPEN FILES AND READ INDEX**
11010 PRINT D$ "OPEN "; FILE$: ".NAMES"
11020 PRINT D$ "READ "FILE$ ".NAMES"
11030 INPUT R: GOSUB 4500
11040 FOR I = 0 TO R - 1: INPUT NAME$(I): NEXT

```

Listing continued.

Listing continued.

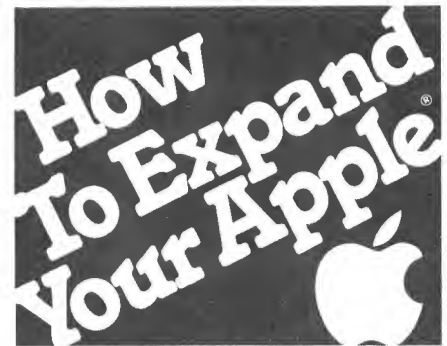
```

11050 PRINT D$"CLOSE"FILE$.NAMES"
11060 PRINT D$"OPEN"FILE$.DATA,L45"
11070 RETURN
11500 REM **READ A RECORD-RN**
11510 PRINT D$"READ"FILE$.DATA,R"RN
11520 INPUT NM$
11530 INPUT AB: INPUT HIT: INPUT B1: INPUT B2: INPUT B3: INPUT
      B4: INPUT RBI: INPUT FA: INPUT ERS
11540 PRINT D$: RETURN
12000 REM **WRITE INDEX FILE**
12010 PRINT D$"OPEN"FILE$.NAMES"
12020 PRINT D$"WRITE"FILE$.NAMES"
12030 PRINT R
12040 FOR I = 0 TO R - 1: PRINT NAME$(I): NEXT
12050 PRINT D$"CLOSE"FILE$.NAMES"
12060 PRINT D$: RETURN
12500 REM **WRITE IND RECORD**
12510 PRINT D$"WRITE"FILE$.DATA,R"RN
12520 PRINT NAME$(RN)
12530 PRINT AB: PRINT HIT: PRINT B1: PRINT B2: PRINT B3: PRINT
      B4: PRINT RBI: PRINT FA: PRINT ERS
12540 PRINT D$
12550 RETURN
15000 REM **SORT ON BATTING AVERAGE**
15020 FOR I = 0 TO R - 1: SEQ(I) = I: NEXT
15030 FOR I = 0 TO R - 1: IF NAME$(I) = "" THEN 15060
15040 RN = I
15050 GOSUB 11500: IF AB = 0 THEN 15060
15055 AVG(I) = FN A(HIT / AB)
15060 NEXT
15100 REM **SORT**
15120 FLAG = 0
15130 FOR J = 0 TO R - 2: REM      SO WE DO NOT GET A SUBSCR
      IPT ERROR
15140 IF AVG(SEQ(J)) = > AVG(SEQ(J + 1)) THEN 15170
15150 TEMP = SEQ(J):SEQ(J) = SEQ(J + 1):SEQ(J + 1) = TEMP
15160 FLAG = 1
15170 NEXT
15180 IF FLAG = 1 THEN 15120
15190 RETURN

```

A\$	General input
AB	At bats
AVG	Average for batting and fielding
AVG(#)	Array for sorting on batting average
B\$(#)	Array for menu items
B1,B2,B3,B4	Singles, doubles, triples, home runs
C	ASCII value of C\$, used to move menu arrow
C\$	Input to select menu item (left or right arrow)
CHANGE	Flag used when changing one entry
CV	Vertical cursor position for paging
D\$	DOS CHR\$(4)
DVICE	Device (screen or printer)
ERS	Fielding errors
FA	Fielding attempts
FILE\$	Your file name
FLAG	Flag for bubble sort
H	Horizontal tab position to draw title square
HIT	Number of hits
I,J	Loop counters
LN	Length of file or player's name
N	Number of item selected
N1B,N2B,N3B,N4B, NHITS,NFA,NERS,NRBI	New singles, doubles, etc.
NAME\$(#)	Array to hold names of players
NM\$	Input string for NAME\$ array
R	Maximum number of players
RN	Record number you select
RT\$	Return
SEQ(#)	Array to index averages for sorting
SRT	Flag (equals 1 if already sorted)
ST\$	Input string for stats
T1B,T2B,T3B,T4B, TA(B),TFA,TJIT,TRBI	Total singles, doubles, etc.
V	Last vertical line of menu
X	Vertical position of menu arrow

Table 2. Program variables and their functions.



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TEN PIN TALLY

Bowling can provide exercise for both you and your Apple. You hit the alley, it keeps the tally.

by Clifford L. Rodgers

Everyone needs to flex more muscles than those required to run a computer. Perhaps you are one of the multitude who get their exercise from bowling. If so, you may find this Bowling Score program handy. It keeps track of your scores, reports your nightly average, and maintains a running average over a season.

Bowling Score is written in AppleSoft. It uses data statements to keep track of your scores instead of the more normal method of putting the data into disk files. I think this method will be more easily understood by novice computerists.

At first, Bowling Score requires very little memory space. Later, as the number of data statements grows, you may run into space problems. To keep the data current, you can delete some of the older data

Program listing. Bowling Score.

```

10 HOME : CLEAR : POKE 216,0:A = FRE (0):D$ = CHR$ (4)
15 REM
16 REM *****
17 REM WHAT,WHO,WHERE,WHEN
18 REM *****
19 REM
20 VTAB (8): HTAB (12): FLASH : PRINT "BOWLING SCORES": NORMAL
22 VTAB (13): HTAB (18): PRINT "BY"
24 VTAB (15): HTAB (12): PRINT "C. L. RODGERS"

```

Listing continued.

statements, renumber and save the program.

The program is documented internally, so it needs little explanation. It is worth noting, however, that if the name used in line 40 and line 730 (which saves the program), is changed several separate score records can be kept on the same disk.

Once you've entered the listing, run the program and answer the questions.

After all new data has been entered run the program again. When you respond Y to the question ARE YOU FINISHED?, the computer will save the program as directed in line 730.

Bowling Score is short and simple. And seeing your average in the privacy of your home is a lot less embarrassing than on the tote board at the alley. ■

You can write Clifford L. Rodgers at 319 Elm St., Shafter, CA 93263.



Listing continued.

```

25 VTAB (17): HTAB (12): PRINT "(805)746-3048"
30 FOR TIME = 1 TO 1000: NEXT TIME
40 NA$ = "CLIFFORD L. RODGERS": GOTO 130
95 REM
96 REM *****
97 REM TURN ON PRINTER
98 REM *****
99 REM
100 PRINT D$;"PR# 1": PRINT " ": RETURN
130 HOME : VTAB (12): INPUT "DO YOU WANT THIS PRINTED ? ";PR$
160 IF LEFT$(PR$,1) = "Y" THEN GOSUB 100
190 IF LEFT$(PR$,1) = "N" THEN SPEED= 150
220 HOME : VTAB (6): PRINT CHR$ (30);NA$; CHR$ (31): PRINT " ": PRINT " "

230 IF LEFT$(PR$,1) = "N" THEN 1000
235 REM
236 REM *****
237 REM COLUMN HEADINGS
238 REM *****
239 REM
250 PRINT TAB( 4); CHR$ (30);"DATE"; CHR$ (31); TAB( 13); CHR$ (30);"SCO
RE"; CHR$ (31);
252 PRINT TAB( 15); CHR$ (30);"TOT AVG"; CHR$ (31); TAB( 15); CHR$ (30);
"LAST 3 AVG"; CHR$ (31): PRINT " ": PRINT " "
275 REM
276 REM *****
277 REM READS DATA & CALCULATES
278 REM *****
279 REM
280 FOR I = 1 TO 1000:J = I: READ A$,S: IF A$ = "END" THEN 520
370 TS = TS + S:ST = ST + S:AVG = TS / 3:AVG = INT (AVG):TAVG = ST / I:TA
VG = INT (TAVG):S$ = STR$(S)
440 IF LEFT$(PR$,1) = "N" THEN 1100
445 REM
455 REM *****
456 REM *****
457 REM PRINTS SCORES & AVGERAGES
458 REM *****
459 REM
460 PRINT A$; TAB( 15 - LEN (S$));S; TAB( 18):TAVG;
461 IF J / 3 < > INT (I / 3) THEN PRINT " "
462 IF J / 3 < > INT (I / 3) THEN 490
463 IF LEFT$(PR$,1) = "N" THEN GOTO 1150
465 REM
466 REM *****
467 REM PRINTS LAST 3 GAME AVGERAGE
468 REM *****
469 REM
470 PRINT TAB( 20);AVG: PRINT " ":TS = 0: NEXT I: PRINT CHR$ (12)
472 TS = 0
490 NEXT I: PRINT CHR$ (12)
515 REM
516 REM *****
517 REM ADVANCE PAGE & PRINTER OFF
518 REM *****
519 REM
520 PRINT CHR$ (12): PRINT D$;"PR# 0": SPEED= 255
550 PRINT : INPUT "ARE YOU FINISHED ? ";F$: PRINT " "
580 IF F$ = "Y" THEN 730
610 INPUT "DO YOU WANT TO ADD MORE DATA ? ";DA$
640 IF LEFT$(DA$,1) = "Y" THEN LIST 10000,50000
670 IF LEFT$(DA$,1) = "N" THEN LIST 1,1000
700 END
725 REM
726 REM *****
727 REM SAVES PROGRAM & NEW DATA
728 REM *****
729 REM
730 PRINT D$;"SAVE BOWLING SCORES-CLIFF"
760 HOME : TEXT : END
795 REM
796 REM *****
797 REM PUTS DATA ON SCREEN
798 REM *****
799 REM
1000 PRINT TAB( 4); CHR$ (30);"DATE"; CHR$ (31); TAB( 13); CHR$ (30);"SC
ORE"; CHR$ (31);
1010 PRINT TAB( 21); CHR$ (30);"TOT AVG"; CHR$ (31); TAB( 30); CHR$ (30);
"LAST 3 AVG"; CHR$ (31): PRINT " ": PRINT " ": GOTO 280
1100 PRINT A$; TAB( 17 - LEN (S$));S; TAB( 23):TAVG;: GOTO 461
1150 PRINT TAB( 34);";AVG: PRINT " ": GOTO 472
1995 REM
1996 REM *****
1997 REM DATA LINES
1998 REM *****
1999 REM
10000 REM DATA ,SCORE
10001 DATA JUN 10 83,149
10002 DATA JUN 10 83,90
10003 DATA JUN 10 83,102
10004 DATA JUN 12 83,134
10005 DATA JUN 12 83,102
10006 DATA JUN 12 83,174
10007 DATA JUN 18 83,122
10008 DATA JUN 18 83,138
10009 DATA JUN 18 83,126
50000 DATA END,0

```

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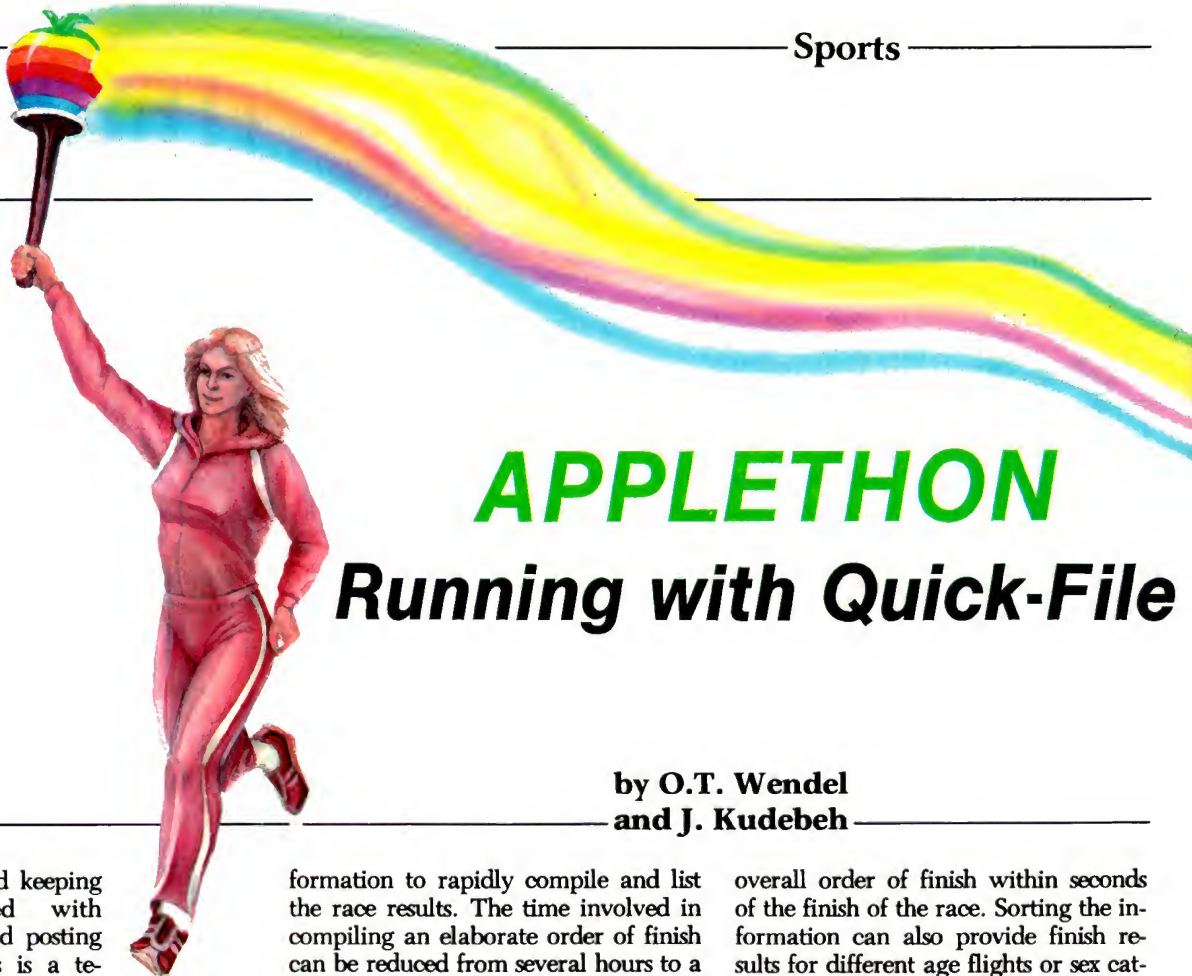
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APPLETHON

Running with Quick-File

by O.T. Wendel
and J. Kudebeh

The record keeping associated with registration and posting of race results is a tedious and time-consuming task. Few tasks are better suited for the data-crunching abilities of an Apple and a good data-base management system such as Quick-File. You can transcribe and store registration forms on a disk; on race day use the stored in-

formation to rapidly compile and list the race results. The time involved in compiling an elaborate order of finish can be reduced from several hours to a few seconds.

You can format Quick-File to contain all the information necessary to print out a detailed listing of race results. You can manage several simultaneous races from within a given file and obtain a detailed printout of the

overall order of finish within seconds of the finish of the race. Sorting the information can also provide finish results for different age flights or sex categories.

Record Format

Most of the record and report formatting needs to be done only once. Once created, these formats can be stored and saved repeatedly. A prototype record would contain the following fields:

NAME:
SEX:
AGE FLIGHT:
RACE NUMBER:
RACE TYPE:
FINISH TIME:

This contains all the information necessary for the posting of a detailed summary of the results.

Two of the field entries need clarification. The race type field identifies the type of race in which an individual is participating (for example, 1-mile, 10K, marathon). To include age group divisions in the final printout you must enter letter designations in the age

```
File: DEMO RACE
Report: 10K MALE DEMO
Selection: SEX equals M
and RACE TYPE equals 10K
```

NAME	SEX	AGE FLIGHT	RACE NUMBER	RACE TYPE	FINISH (MIN:SEC)
DANE SCHILDT	M	B	362	10K	33:19
JIM BOWWER	M	A	356	10K	36:51
DOREY WELCHLIC	M	B	364	10K	38:06
MARK BOWARD	M	B	369	10K	39:43
RAY HARROW	M	C	366	10K	39:48
MIKE PERRETI	M	B	353	10K	41:45
SAM CRACHMAN	M	B	365	10K	41:50
DON PERRETI	M	B	368	10K	42:50
DON MARTIN	M	B	351	10K	43:10
BARNEY BILFIELD	M	C	370	10K	43:37
JOHN SUTTLAGE	M	E	357	10K	44:04
MARK LOREY	M	B	358	10K	44:12
MARK SMETZ	M	B	355	10K	44:58
JEFF FULLEN	M	B	354	10K	47:51
BEN GRIEVES	M	E	350	10K	49:23
TIM TORCKA	M	B	352	10K	54:24
MIKE SOLECK	M	B	359	10K	55:40

Figure. A prototype report format selecting the male entrants of a 10-kilometer race. This overall finish report was obtained by arranging the Finish field. An age division segregated report can be generated by an additional arrangement of the Age Flight field.

Write to O.T. Wendel and J. Kudebeh at Bio-source Software, 2105 South Franklin, Kirksville, MO 63501.

flight category. The simplest approach is to designate flight A as the twenty-year-old-and-under bracket. Each successive letter could then indicate the next corresponding decade.

Report Format

The figure shows a prototype report format. Quick-File can be configured to include all of the entered fields, but you probably would not want the posted results to include such things as the address and phone number. With a little experimentation you can establish the spacing that makes an attractive and functional report. You should avoid large horizontal spaces because they make reading across the report difficult.

You should create individual report formats for male and female participants in each race type. These reports are easily developed using Quick-File's open-apple S (select) function. Each report would select one race type and one of the sexes. These report formats should be stored in the report directory using a distinctive name such as "10K MALES".

Posting the Results

If your pre-race preparation has been sufficient, the only entry that needs to be made on the day of the race is the finish time of each runner. When the last runner crosses the finish line and the last time is entered into the database, you can create the final report. This will actually be several reports derived from the common database. The database contains the records for all participants in all the races, and the report formats created previously can be used to rapidly select the records appropriate for a given race.

Once you select a given set of records for the database, use the open-apple A (arrange) function on the "Finish Time" field to give an overall order of finish. The fastest runner will appear at the top of the listing and the slowest at the bottom. Print this report followed by a second, alphabetical arrangement of the "Age Flight" field. This printout will segregate each age flight with the fastest runner first and the slowest runner last. Since you cannot skip lines between age flights, you

must draw a dividing line between each age division to simplify analysis.

Up to approximately 350 records can be stored in the database. Obviously, the 17,000 runners in the New York Marathon would be a little difficult to manage. However, most local races would seldom tax the abilities of the system. In large races avoid the problem by maintaining separate databases for different races or sexes.

You can find other enhancements that will make the system even more attractive. For example, the calculation function could automatically calculate a runner's finish time.

You can accomplish the task of compiling the results in less than an hour. Entering records does take time, but since most races have pre-registration, the job can be divided over several evenings. ■

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GOLF SLICE II

With this computer simulation you can tee off on a stormy day—and build your own course, too.

by Floyd Berghout

Eighteen holes of golf, even if it's pouring outside or you have a broken toe? Yes—with Golf Slice II! This game, for one or two players, is written in Applesoft and uses a shape table to display bushes, lakes, sand traps, greens and tees on the hi-res screen. The display is black and white, so it works on a monitor, a black and white TV or a color TV.

Just as in regular golf, you need to decide which iron or wood to use and which direction to aim. You might even want to hold your breath for a little bit of luck. The program does not automatically penalize you for bad shots, so you are on your honor to play honestly.

As the game begins you must specify one or two players, and the number of holes you wish to play, from 1 to 18. When the fairway is drawn on the screen, all commands appear at the bottom. You must decide whether to hit an iron or wood, or to putt. If you hit, you must choose between a 1 to 3 wood or a 4 to 9 iron. If you putt, you must decide on a putt string between 1 and 10.

Perhaps the most difficult part of the game is deciding on the direction to hit the ball. To aim toward the top of the screen, specify 0 degrees. Ninety degrees is to the right, 180 degrees straight down, and 270 degrees to the left. You may use any number in the 360 degree circle.

The computer automatically keeps track of your score for the hole and the round. You can check how you are doing compared to par after each hole is

completed and at the end of the round.

When you land in a sand trap, under a bush or in a lake you must take a penalty stroke by putting out of the hazard. It is considered bad manners by the USGA to use an iron or wood under any of these penalty conditions (not to mention what your opponent may do if you are caught trying to save a stroke).

Listing 1 is Golf Slice II, written in Applesoft, as I mentioned. Listing 2, GOLF.SHAPES, is the shape table used by Golf Slice II for creating the course. To enter Listing 2 into the computer, access the system monitor with CALL -151, then enter the data by typing 8000:08 00 30 00 50 00 C0 00, etc. When the entire listing has been entered, save it by typing BSAVE GOLF.SHAPES,A\$8000,L\$2C5. Check your shape table carefully if some of the shapes don't look right on the screen.

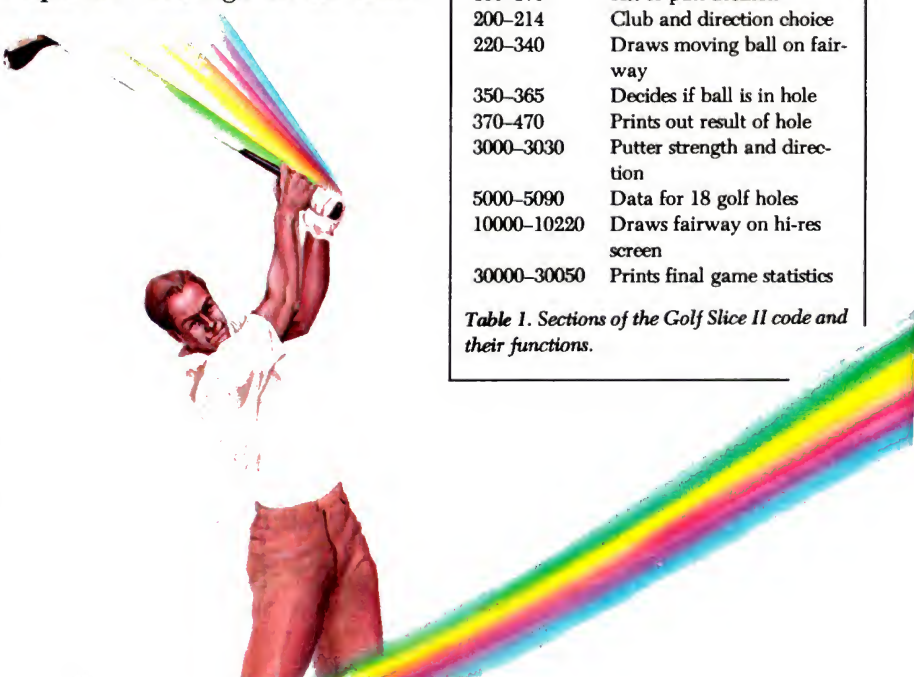
When the above procedure has been accomplished, you are ready for your first round of golf.

For those who are interested in a little more detail about the Golf Slice II listing, Table 1 indicates the function of each section of code. The shape table, GOLF.SHAPES, occupies memory locations \$8000 to \$82C4. The shapes included appear in Table 2.

The Golf Slice II variables used in the GOLF.SHAPES table are listed in Table 3. By changing the values in the data statements for the tee, green, flag, lakes, sand traps and bushes, you can design your own golf course. ■

Lines	Function
1-35	Initialize and load shape table
39-130	Instructions and setup
150-170	Hit or putt decision
200-214	Club and direction choice
220-340	Draws moving ball on fairway
350-365	Decides if ball is in hole
370-470	Prints out result of hole
3000-3030	Putter strength and direction
5000-5090	Data for 18 golf holes
10000-10220	Draws fairway on hi-res screen
30000-30050	Prints final game statistics

Table 1. Sections of the Golf Slice II code and their functions.



- 1 Flag
- 2 Green
- 3 Ball 1
- 4 Tee
- 5 Bush
- 6 Sand trap
- 7 Lake
- 8 Ball 2

Table 2. Shapes in the GOLF.SHAPES shape table.

Variable/s	Function
IE	Debugging aid variable
BALL	Ball 1 and 2 shape number
SC	Player 1 and 2 hole score
PT	Par total for round
ST	Player 1 and 2 round total
NP	Number of players
PL	Current player
THOLES	Total holes to play
PAR	Par for hole
CLUB	Club number
DIR	Direction to hit, in degrees
HIT	Hit strength (modified by a random number function)
DX,DY	X and Y delta component
XD,YD	DX and DY divided into 20 small parts
XN,YN	New ball screen coordinates
XO,YO	Old ball screen coordinates
XS,YS	Saved ball 1 and 2 positions
DL	Number of increments to divide DX and DY into
F6,F7,F8,F9	Variables used in deciding if ball is in hole
FINISH	Number of players finished
XX	Temporary variable
TX,TY	Screen location of tee
GX,GY	Screen location of green
FX,FY	Screen location of flag
L1,L2	Screen location of lake 1
L3,L4	Screen location of lake 2
S1,S2	Screen location of trap 1
S3,S4	Screen location of trap 2
S5,S6	Screen location of trap 3
B1,B2	Screen location of bush 1

B3,B4	Screen location of bush 2
B4,B6	Screen location of bush 3
B7,B8	Screen location of bush 4
B9,BA	Screen location of bush 5

Table 3. Golf Slice II variables and their functions.

Listing 1. Golf Slice II.

```

1 REM GOLF SLICE II
2 REM FLOYD L BERGHOUT
3 REM 868 HEARTWOOD CIRCLE
4 REM FRUIT HEIGHTS, UTAH 84037
5 LOMEM: 16384
6 HIMEM: 32768
7 HOME : VTAB 10: PRINT " WELCOME TO GOLF SLICE"
8 PRINT CHR$(4);"BLOAD GOLF.SHAPES,A$8000": POKE 232,0: POKE 233,128
9 TEXT
10 IE = 0
11 BALL(1) = 3:BALL(2) = 8
12 SC(1) = 0:SC(2) = 0
13 PT = 0
14 ST(1) = 0:ST(2) = 0
15 FOR I = 1 TO 1000: NEXT I
16 HOME : INVERSE : PRINT " INSTRUCTIONS ": NORMAL
17 PRINT : PRINT " THIS IS AN EIGHTEEN HOLE CHAMPIONSHIP": PRINT " COURSE
18 "
19 PRINT : PRINT " YOUR BAG CONTAINS THE FOLLOWING": PRINT " CLUBS:
20 "
21 PRINT " 1 - 3 WOODS"
22 PRINT " 4 - 9 IRONS"
23 PRINT " PUTTER"
24 PRINT : PRINT " YOU MAY CHOOSE TO HIT OR PUTT": PRINT " ON EACH
25 TURN"
26 PRINT : PRINT " IF YOU HIT: YOU MAY CHOOSE": PRINT " A 1 - 3 WO
27 OD OR 4 - 9 IRON"
28 PRINT : PRINT " IF YOU CHOOSE TO PUTT: YOU ": PRINT " WILL BE AS
29 KED TO CHOOSE A STRENGTH": PRINT " BETWEEN 1 AND 10"
30 PRINT : PRINT "PRESS SPACE TO CONTINUE": GET A$
31 HOME : PRINT " FOR EACH HIT OR PUTT YOU WILL": PRINT " NEED TO INPUT
32 A DIRECTION TO HIT"
33 PRINT : PRINT "USE ANY ANGLE FROM 0 TO 360 AS FOLLOWS:"
34 PRINT
35 PRINT " 315 0 45"
36 PRINT " 270- + - 90"
37 PRINT " 225 180 135 EXAMPLE: 50"
38 PRINT : PRINT
39 PRINT " YOU MAY PLAY ONE OR TWO PLAYERS"
40 PRINT
41 PRINT : INVERSE : PRINT " IF YOU LAND IN A LAKE OR UNDER A TREE"
42 PRINT " TAKE A PENALTY BY PUTTING OUT OF THE "
43 PRINT " HAZZARD ON YOUR NEXT HIT " : NORMAL
44 PRINT : PRINT "YOU MUST PUTT THE BALL TO THE BASE": PRINT "OF THE FLAG
45 STICK": PRINT "*****GOOD LUCK*****"
46 PRINT : PRINT "PRESS SPACE TO CONTINUE": GET A$
47 HOME : INPUT "HOW MANY PLAYERS? (1/2)":NP
48 PL = 1
49 PRINT
50 PRINT : PRINT : PRINT "HOW MANY HOLES DO YOU WISH TO PLAY?": INPUT "CH
51 OOSE FROM 1 TO 18 HOLES: ";THOLE
52 IF THOLE < 1 OR THOLE > 18 THEN 90
53 GOSUB 10000
54 PRINT : PRINT : PRINT : INVERSE : PRINT "
55 ": NORMAL : PRINT "HOLE NO: ";HOLE: " PAR: ";PAR: PRINT "P
56 COMMAND: 1=HIT 2=PUTT":A
57 SC(PL) = SC(PL) + 1
58 ON A GOTO 200,3000
59 GOTO 150
60 PRINT " CLUBS": INVERSE
61 PRINT "DRIVER": HTAB (8): PRINT "WOODS": HTAB (14): PRINT " IRONS
62 ": NORMAL
63 PRINT " 1 " : HTAB (8): PRINT " 2 3 " : HTAB (14): PRINT "4 5 6 7
64 8 9"
65 INPUT "SELECT CLUB: ";CLUB
66 DL = 20
67
68 INVERSE : PRINT " ": NORMAL
69 PRINT "DIRECTION: 315 0 45"
70 PRINT " : 270 -+- 90"
71 INPUT " : 225 180 135 " : DIR
72 HIT = 10 * (11 - CLUB) *
73 ( RND (1) / 2 + .75)
74 DIR = DIR * 3.1415926 / 180
75 DX = SIN (DIR) * HIT
76 XD = DX / DL
77 DY = COS (DIR) * HIT
78 DY = - DY
79 YD = DY / DL
80 XN = XS(PL) + DX:XO = XS(PL)
81 YN = YS(PL) - DY:YO = YS(PL)
82 XDRAW BALL(PL) AT XS(PL),YS(PL)
83 FOR I = 1 TO DL
84 XO = XO + XD: IF XO > 279 THEN XO = 279
85 YO = YO + YD: IF YO < 0 THEN YO = 0
86 IF XO < 0 THEN XO = 0
87 IF YO > 159 THEN YO = 159
88 XDRAW BALL(PL) AT XO,YO
89 XDRAW BALL(PL) AT XO,YO
90 NEXT
91 XS(PL) = XO:YS(PL) = YO
92 XDRAW BALL(PL) AT XS(PL),YS(PL)
93 DH = 3
94 F7 = FX + DH:F8 = FX - DH:F9 =
95 FY + DH:F6 = FY - DH

```

Listing continued.

Listing continued.

```

350 IF XS(PL) < = F7 AND XS(PL) > = F8 AND YS(PL) < = F9 AND YS(PL) >
    = F6 THEN 370
360 IF NP = 2 AND FINISH = 0 THEN PL = 3 - PL: IF PL = 2 AND V2 = 0 THEN
    V2 = 1: XDRAW BALL(2) AT XS(2),YS(2)
365 GOTO 150
370 ST(PL) = ST(PL) + SC(PL)
372 FINISH = FINISH + PL
373 PRINT : PRINT : PRINT : PRINT "PLAYER ";PL;" HOLED OUT": FOR I = 1 TO
    1000: NEXT I
374 XDRAW BALL(PL) AT XS(PL),YS(PL)
375 IF NP = 2 AND FINISH < 3 THEN PL = 3 - PL: GOTO 150
380 PT = PT + PAR
390 PRINT : PRINT : PRINT
400 PRINT "HOLE FINISHED" PAR ";PAR;" TOTAL: ";PT
410 PRINT "PLAYER 1" ";SC(1);" ";ST(1)
420 IF NP < > 2 THEN 450
430 PRINT "PLAYER 2" ";SC(2);" ";ST(2)
450 PRINT "PRESS SPACE TO CONTINUE": GET AS$
455 SC(1) = 0:SC(2) = 0:PL = 1
460 IF HOLE = THOL THEN 30000
470 GOTO 130
3000 PRINT : PRINT : PRINT
3002 INVERSE : PRINT " PUTTER STRENGTHS " : NORMAL
3004 PRINT " 1 2 3 4 5 6 7 8 9 10"
3006 INPUT "CHOOSE PUTTER STRENGTH: ";CLUB
3008 INVERSE : PRINT " : NORMAL
3010 PRINT "DIRECTION: 315 0 45"
3012 PRINT " : 270 +- 90"
3014 INPUT " : 225 180 135 ";DIR
3015 XX = RND (1) / 4 + 1
3017 XX = 3 * XX
3020 HIT = INT (CLUB * XX)
3025 DL = 1
3030 GOTO 225
5000 DATA 1,4,10,150,200,20,200,20,200,50,0,0,150,10,0,0,0,10,10,20,20
    ,10,30,100,150,200,100
5010 DATA 2,4,250,150,50,50,50,50,150,100,150,50,50,100,0,0,0,0,250,125,
    200,150,150,150,100,20,110,30
5015 DATA 3,4,50,145,250,50,250,40,200,120,0,0,225,10,125,75,0,0,50,100,
    150,50,250,100,150,150,100,150
5020 DATA 4,5,250,10,22,120,22,120,0,0,0,50,110,75,120,100,130,50,75,1
    00,50,150,50,150,120,200,100
5025 DATA 5,3,250,50,50,50,50,50,0,0,0,0,0,0,0,0,100,25,150,25,50,10
    0,150,100,200,100
5030 DATA 6,3,90,60,250,50,250,55,180,50,0,0,0,0,0,0,0,100,25,50,25,10
    0,100,150,100,250,100
5035 DATA 7,4,255,20,50,100,50,100,60,50,100,125,50,25,50,75,0,0,150,50,
    200,150,85,100,50,150,0,0
5040 DATA 8,5,20,150,230,30,230,30,100,80,220,90,230,55,210,75,175,80,50
    ,120,60,90,140,75,135,100,160,110
5045 DATA 9,3,130,150,140,25,145,25,75,60,160,60,90,10,0,0,0,90,110,10
    0,130,160,120,180,95,185,25
5050 DATA 10,5,260,150,40,60,30,60,50,130,90,90,140,90,170,100,0,0,125,1
    20,130,140,160,140,170,120,205,135
5055 DATA 11,3,250,80,50,80,50,80,150,100,0,0,100,50,100,100,0,0,210,40,
    160,40,140,40,240,100,200,100
5060 DATA 12,4,250,150,50,100,50,100,60,40,110,125,175,125,175,185,50,18
    0,110,40,110,90,160,60,200,75,225,100
5065 DATA 13,3,50,150,175,75,175,75,80,80,150,140,175,110,100,110,100,12
    0,175,25,125,50,50,40,130,90,100,150
5070 DATA 14,4,50,50,225,125,225,125,150,50,50,100,225,100,225,150,180,1
    25,100,50,50,150,110,150,200,75,0,0
5075 DATA 15,4,250,150,100,50,100,50,200,75,0,0,80,20,0,0,0,0,240,100,24
    0,125,200,100,160,90,125,75
5080 DATA 16,3,150,50,75,140,75,140,150,100,0,0,100,110,0,0,0,0,100,50,7
    5,75,50,90,0,0,0,0
5085 DATA 17,5,10,10,250,140,250,140,150,140,0,0,0,0,0,0,0,0,120,50,40,1
    00,170,100,200,110,75,150
5090 DATA 18,5,10,149,249,20,249,20,125,20,160,120,210,20,220,40,125,55,
    20,130,35,130,50,130,125,67,125,80
10000 HGR : SCALE= 1: ROT= 0: HCOLOR= 3
10001 HN = 1: IF IE < > 1 THEN 10003
10002 VTAB 24: INPUT "HOLE NO: ";HN
10003 FOR I = 1 TO HN
10005 READ HOLE,PAR,TX,TY,GX,GY,FX,FY,L1,L2,L3,L4,S1,S2,S3,S4,S5,S6,B1,B2
    ,B3,B4,B5,B6,B7,B8,B9,BA
10006 NEXT
10010 DRAW 4 AT TX,TY
10020 DRAW 2 AT GX,GY
10030 DRAW 1 AT FX,FY
10040 IF L1 < > 0 THEN DRAW 7 AT L1,L2
10050 IF L3 < > 0 THEN DRAW 7 AT L3,L4
10060 IF S1 < > 0 THEN DRAW 6 AT S1,S2
10070 IF S3 < > 0 THEN DRAW 6 AT S3,S4
10080 IF S5 < > 0 THEN DRAW 6 AT S5,S6
10090 IF B1 < > 0 THEN DRAW 5 AT B1,B2
10100 IF B3 < > 0 THEN DRAW 5 AT B3,B4
10110 IF B5 < > 0 THEN DRAW 5 AT B5,B6
10120 IF B7 < > 0 THEN DRAW 5 AT B7,B8
10130 IF B9 < > 0 THEN DRAW 5 AT B9,BA
10135 XDRAW BALL(1) AT TX,TY
10136 VTAB 24
10137 V2 = 0
10200 XS(1) = TX:YS(1) = TY:XS(2) = TX:YS(2) = TY
10215 FINISH = 0
10220 RETURN
30000 PRINT : PRINT : PRINT
30002 TEXT : HOME
30005 PRINT " ***GAME OVER***"
30006 PRINT : PRINT
30010 PRINT " PAR: ";PT

```

Listing continued.

Listing continued.

```

30015 PRINT
30020 PRINT " PLAYER 1: ";ST(1)
30030 IF NP = 1 THEN END
30040 PRINT " PLAYER 2: ";ST(2)
30050 END

```

Listing 2. GOLF.SHAPES.

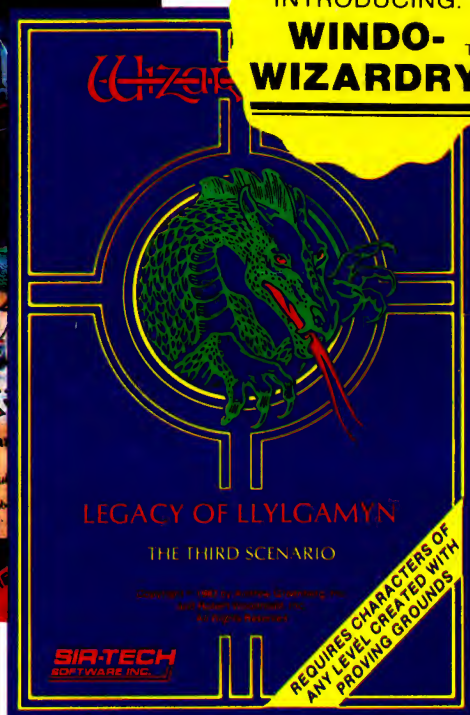
```

8000- 08 00 30 00 50 00 C0 00
8008- E0 00 00 01 40 01 00 01
8010- B0 02 FF FF FF FF FF FF
8018- FF FF FF FF FF FF FF FF
8020- FF FF FF FF FF FF FF FF
8028- FF FF FF FF 01 00 04 00
8030- 24 24 24 24 24 2C 2E 2E
8038- 3E 3F 2D 2D 00 00 FF FF
8040- FF FF FF FF FF FF FF FF
8048- FF FF FF FF 01 00 04 00
8050- 92 92 92 92 92 92 3A 27
8058- 3F 3C 27 3F 3C 27 3F 24
8060- 3C 3C 3C 3C 3F 3F 2C 3C
8068- 24 2C 2C 2C 2C 2C 2C 2C
8070- 2C 2C 2C 24 2D 24 25 2C
8078- 2D 2D 2C 2C 24 2D 25 2D
8080- 2D 35 35 35 35 2D 2E
8088- 2E 2E 2E 36 2D 2E 2E
8090- 2E 2E 2E 36 3E 2F 3E
8098- 3E 3E 3E 3E 3E 3F 36
80A0- 3E 2F 37 37 37 3E 3E
80A8- 37 3F 3F 3F 07 00 00
80B0- FF FF FF FF FF FF FF FF
80B8- FF FF FF FF 01 00 04 00
80C0- 90 3A 3C 24 25 2D 2E 36
80C8- 37 4E 29 E5 24 E4 32 00
80D0- 00 FF FF FF FF FF FF FF
80D8- FF FF FF FF 01 00 04 00
80E0- 92 92 3F 3F 3F 3F 24
80E8- 24 24 2C 2D 2D 2D 2D
80F0- 2D 2D 2D 2D 36 36 3E
80F8- 3F 3F 3F 3F 01 00 04 00
8100- 92 92 3A 3C 2C 3C 27 27
8108- 25 25 25 27 27 2C 2C 35
8110- 25 25 35 35 25 2D 36
8118- 35 35 3E 2E 35 35 3E
8120- 3E 37 35 3E 3E 27 37
8128- 37 3F 34 00 00 FF FF
8130- FF FF FF FF FF FF FF FF
8138- FF FF FF FF 01 00 04 00
8140- 2D 2D 4D 49 49 29 2D
8148- 2D 55 09 3F 3F 3F 3F
8150- 3F DF 3F 3F 3F 3F 3F
8158- 3F 9F 2B 2D 2D 2D 2D
8160- 2D 2D 2D 2D 2D 2D 2D
8168- 2D 2D 2D 55 3F 3F 3F
8170- 3F 3F 3F 3F 3F 3F 3F
8178- 3F 3F 3F 3F 3F 3F 29
8180- 2D 2D 2D 2D 2D 2D 2D
8188- 2D 2D 2D 2D 2D 2D 2D
8190- D5 3B 3F 3F 3F 3F 3F
8198- 3F 3F 3F 3F 3F 3F 3F
81A0- 57 09 2D 2D 2D 2D 2D
81A8- 2D 2D 2D 2D 2D AD 0B 3B
81B0- 3F 3F 3F 3F 3F 3F 3F
81B8- 49 09 2D 2D 2D 2D 00 00
81C0- 37 37 3F 3E 3E 3F 37
81C8- 3F 3E 3E 3E 01 00 04 00
81D0- 92 92 92 92 92 92 27
81D8- 27 27 3C 3F 27 27 27
81E0- 3F 3C 3C 3C 3C 24 25
81E8- 25 2C 24 24 2D 2D 25
81F0- 25 25 2D 2D 2C 2D 35
81F8- 35 35 2D 2E 2E 35 2D
8200- 2D 2D 25 25 25 25 2C
8208- 2C 2D 35 35 2D 2E 35
8210- 2D 35 2D 36 2E 36 35
8218- 36 2D 2E 3E 3E 3E 3E
8220- 37 3F 3F 3F 3E 3F 37
8228- 37 3F 3E 3F 3E 3E 3E
8230- 3F 3F 3E 3E 3F 27 27
8238- 27 3F 27 7F 08 08 48 2D
8240- 2D 2D 2D 2D 2D 2D 60 08
8248- 08 08 08 3F 3F 3F 3F
8250- 3F 3F 3F 3F 3F 3F FF 18
8258- 18 18 08 2D 2D 2D 2D
8260- 2D 2D 2D 2D 2D 2D 2D
8268- 2D 2D 2D 2D 2D 2D 18
8270- 18 18 18 3F 3F 3F 3F
8278- 3F 3F 3F 3F 3F 3F 3F
8280- 3F 3F 3F 3F 3F 3F 3F
8288- 47 08 08 08 28 2D 2D
8290- 2D 4D 49 49 49 49 49
8298- 2D 2D 2D 2D 05 00 00 3F
82A0- 3F 3F 3F 3F 3F 3F 3F
82A8- 3F 3F 3F 3F 01 00 04 00
82B0- 90 2A 2C 24 27 3F 36
82B8- 35 D4 1B 3F 27 2C 2C 2C
82C0- 24 3F 37 06 00

```


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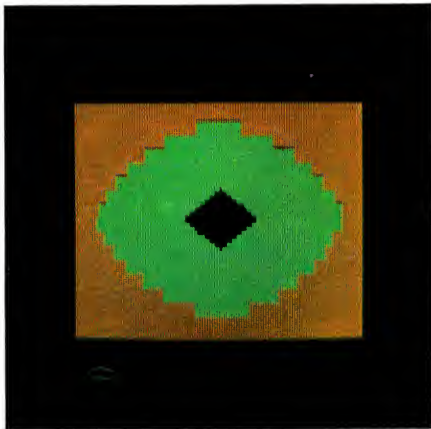
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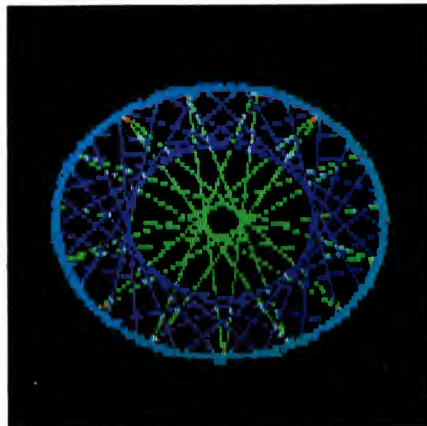
DESIGN

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Take a few minutes to type in Design Maker and you will be able to create your own string art designs in black and white or "living" color. Your creations will not only be beautiful to behold, but it will be fun to watch the computer draw them. The drawing process creates some very interesting visual effects.

This program, Listing 1, can create designs as simple as a triangle or as complex as the above. You are the art-



ist, the keyboard is your brush and the screen is the canvas. Your creations are limited only by your imagination.

You will be using hi-res graphics and the eight colors available in that mode. If you have a monochromatic display, I suggest that you use colors 0 and 3.

A Short Explanation

I have tried to make Design Maker as "user-friendly" as possible by providing prompts to lead you through the creative process. When you have finished a particular design, you can save it to disk for later recall or printing. You will be prompted for a name and the program will do the rest. If one of your designs doesn't work out, just answer N when asked about saving it



Figure 2

and begin all over again.

I have also provided a second program called Display Designs, Listing 2, that enables you to recall designs (by name) from disk storage and display them on the screen. This program is self-explanatory: Just type it in and run.

A Sample Design

Although Design Maker is easy to use and experimentation will soon make you expert, the simplified flow chart in Figure 3 and the following explanation may make you feel more comfortable. If you type in the main program first, you can follow along on the computer.

Type RUN. The title appears, then disappears. The first prompt then asks you to choose a basic shape—a circle, a rectangle or a triangle. Respond with 1, the circle, and then, upon the next prompt, specify the number of points on the circle. Type in 21 and press return. There is a short pause as the computer calculates the locations of

MAKER

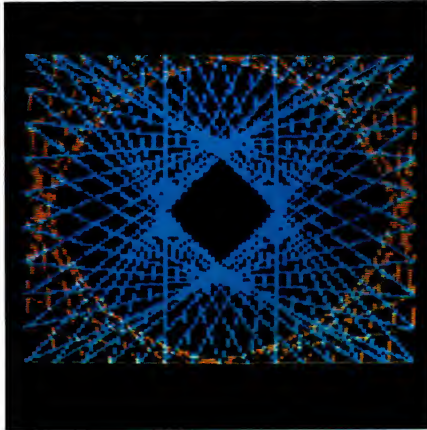


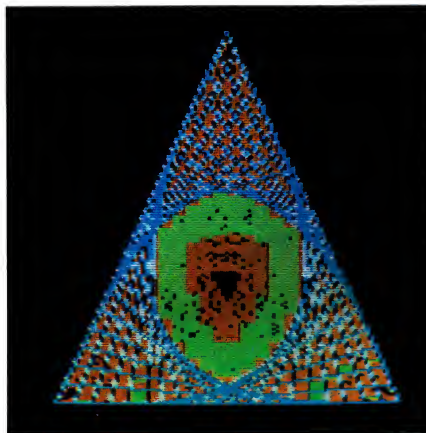
Figure 1

the points. Then, presto!, 21 points appear arranged in a circular pattern.

More prompts now appear below your circle. The choices for the first, PATTERN TYPE, are 1-CONTINUOUS and 2-ALL POINTS. Press 1 and you must specify a starting point; press 5 and you must specify a "skip." Press 6 (for skipping six points) and, when asked for a color, press 3 for black.

If you typed in Listing 1 and have been following along, the design is now on the screen. It's a triangle—the computer has drawn three lines. If you were watching closely you noticed that it started at one point (point 5) and drew a line from there to point 12 (skipping the six points 6, 7, 8, 9, 10 and 11 just as you requested). Then it drew a line from point 12 to point 19 (skipping 13 through 18), and finally from 19 back to 5 (skipping 20, 21, 1, 2, 3 and 4).

It stopped because it had returned to the original starting point, point 5. This pattern is what you requested when you chose the option 1-CONTINUOUS. If you had started with 2-ALL POINTS, the computer would have drawn a line from point 1 to point 7, then from 2 to 8, 3 to 9, and so on. The last line would have been from point 21 to point 6.



You now have one "set" of lines on the screen and the ADD MORE LINES?—> prompt has appeared. If you press Y, you will again be asked for pattern type, skip, etc., and a new set of lines will grace your original design. Refer to the flow chart to see what other prompts and choices are available here.

More Examples

Two more examples of designs you can create with Design Maker are shown in Figures 1 and 2. Figure 1 is a rectangle with 29 points across the top and 19 points on each side, embellished by the following sequence of choices:

```
CONTINUOUS
start 1
skip 17
color 3
add more lines Y
CONTINUOUS
start 1
skip 37
color 3
```

by Kenneth Hummel

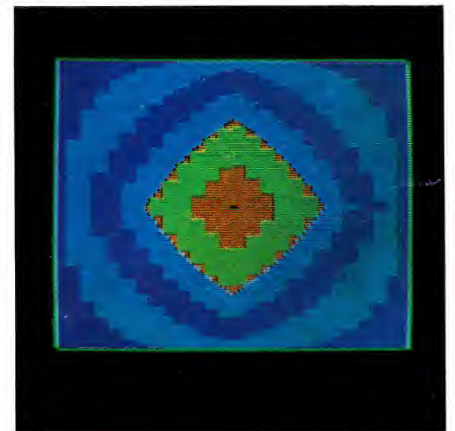


Figure 2 is a triangle with 75 points on each side plus the choices:

```
CONTINUOUS
start 1
skip 95
color 3
add more lines Y
ALL POINTS
skip 15
color 3
```

You can correspond with Kenneth Hummel at 1308 Townley Drive, Bloomington, IL 61701.

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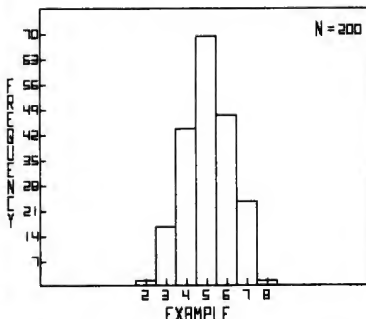
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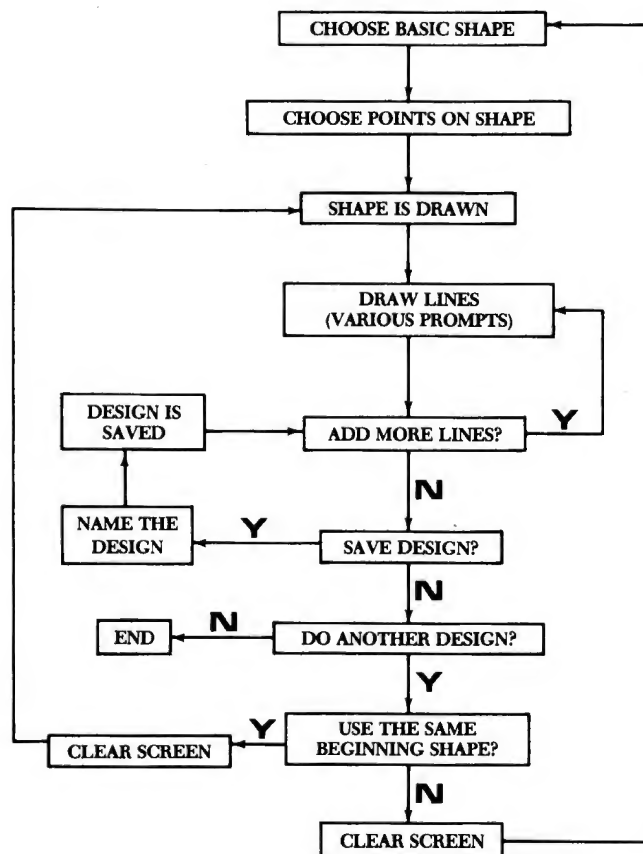


Figure 3. Simplified flow chart.

In Summary

The more you play with this program, the easier it will get, and your

designs will become better and better. Don't be afraid to experiment—that is half the fun of this program! ■

Listing 1. Design Maker.

```

10 TEXT : HOME : SPEED= 80
20 UTAB 10: PRINT TAB( 15)"DESIGN MAKER"
30 UTAB 13: PRINT TAB( 20)"BY": PRINT TAB( 16)"KEN HUMMEL"
40 DIM R(300),C(300)
50 G$ = CHR$( 7):M$ = "ONE MINUTE PLEASE":S$ = ""
60 FOR I = 1 TO 40:S$ = S$ + " ": NEXT
70 FOR I = 1 TO 25: PRINT :S = PEEK ( - 16336) + PEEK ( - 16336): NEXT
: SPEED= 255
80 SPEED= 255: HOME : UTAB 5: PRINT TAB( 8)"CHOOSE A BASIC SHAPE"
90 PRINT TAB( 13)"1--CIRCLE": PRINT TAB( 13)"2--RECTANGLE"
100 PRINT TAB( 13)"3--TRIANGLE": PRINT : PRINT TAB( 15)"--":
110 GET C$: PRINT C$:C = INT ( VAL (C$)): ON C GOTO 130,180,320
120 PRINT : PRINT "TRY AGAIN--": GOTO 110
130 PRINT : INPUT "HOW MANY POINTS ON THE CIRCLE?":W
140 W = INT (W):A = 6.283185 / W: IF W > 19 AND W < 301 THEN 160
150 PRINT G$: PRINT : INPUT "20 TO 300 -- PLEASE --":W: GOTO 140
160 PRINT : PRINT M$:S = 70
170 FOR I = 1 TO W:R(I) = 80.1 - S * SIN (A * (I - 1)):C(I) = 140 + S *
( COS (A * (I - 1))): NEXT : GOTO 390
180 PRINT : INPUT "HOW MANY POINTS ACROSS THE TOP?":T
190 T = INT (T): IF T < 91 AND T > 5 THEN 210
200 PRINT G$: PRINT : INPUT " 6 TO 90 --TRY AGAIN--":T: GOTO 190
210 PRINT : INPUT "HOW MANY POINTS ON EACH SIDE?":S
220 S = INT (S): IF S < 61 AND S > 5 THEN 240
230 PRINT G$: PRINT : INPUT " 6 TO 60 --TRY AGAIN--":S: GOTO 220
240 PRINT : PRINT M$:W = T + T + S + S - 4
250 SP = INT (270 / T): IF INT (150 / S) < SP THEN SP = INT (150 / S)
260 SC = 141 - INT (T * SP / 2):SR = 81 - INT (S * SP / 2):LC = SC + (T -
1) * SP:LR = SR + (S - 1) * SP
270 FOR I = 1 TO T:C(I) = SC + (I - 1) * SP:R(I) = SR
280 C(T + S + I - 2) = SC + (T - I) * SP:R(T + S + I - 2) = LR: NEXT

```

Listing continued.

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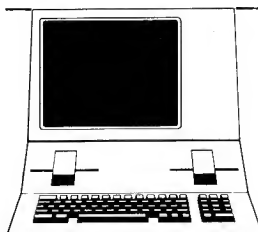
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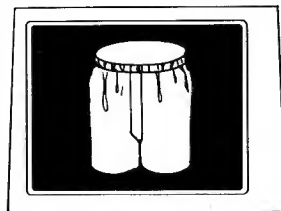
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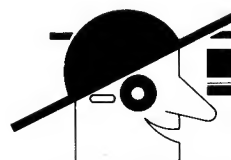
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Listing continued.

```

290 FOR I = 1 TO S - 2: C(T + I) = LC: R(T + I) = SR + I * SP
300 C(T + T + S + I - 2) = SC: R(T + T + S + I - 2) = LR - I * SP: NEXT
310 GOTO 390
320 PRINT : INPUT "HOW MANY POINTS ON EACH SIDE-->"; N
330 N = INT (N): IF N > 3 AND N < 76 THEN PRINT : GOTO 350
340 PRINT G$: PRINT : INPUT " 4 TO 75 --PLEASE-->"; N: GOTO 330
350 PRINT M$: SP = INT (140 / N): SR = 81 - INT (SP * (N - 1) / 2): SC = S
  P / ( SQR (3)): W = 3 * N - 3
360 FOR I = 0 TO N - 2: T = I + 1: R(T) = SR + I * SP: C(T) = INT (140 + I *
  SC)
370 R(W - I) = SR + T * SP: C(W - I) = INT (140 - T * SC): NEXT
380 T = 2 * N - 1: FOR I = 1 TO N - 1: R(T - I) = R(T): C(T - I) = INT (C(T)
  ) + SC * I * 2: NEXT
390 HGR : HCOLOR = 3: FOR I = 1 TO W: HPLLOT C(I), R(I): NEXT
400 POKE 34, 21
410 PRINT : PRINT : VTAB 22: PRINT "PATTERN TYPE 1--CONTINUOUS"
420 HTAB 16: PRINT "2--ALL POINTS?-->";
430 GET TY$: PRINT TY$: TY = INT (VAL (TY$)): IF TY = 2 THEN 470
440 IF TY < > 1 THEN PRINT G$: PRINT "WHAT?-->"; GOTO 430
450 PRINT : PRINT : PRINT "START (1 TO "; W; ": PRINT "?": INPUT "-->"; ST
460 ST = INT (ST): IF ST < 1 OR ST > W THEN PRINT G$: GOTO 450
470 PRINT : PRINT : PRINT : INPUT "SKIP?-->"; SK: SK = INT (SK + 1)
480 PRINT : PRINT : INPUT "COLOR (0 TO 7)?-->"; CL
490 CL = INT (CL): IF CL < 0 OR CL > 7 THEN PRINT G$: GOTO 480
500 PRINT : PRINT : HCOLOR = CL: IF TY = 2 THEN 560
510 I = ST + SK: LI = ST: GOTO 540
520 IF I = ST THEN 590
530 I = I + SK
540 IF I > W THEN I = I - W: GOTO 540
550 HPLLOT C(LI), R(LI) TO C(I), R(I): LI = I: GOTO 520
560 FOR I = 1 TO W: LI = I + SK
570 IF LI > W THEN LI = LI - W: GOTO 570
580 HPLLOT C(I), R(I) TO C(LI), R(LI): NEXT
590 VTAB 21: PRINT S$
600 VTAB 21: ST$ = STR$ (ST)
610 IF TY = 2 THEN ST$ = "----"
620 ON C GOTO 630, 650, 640
630 PRINT " POINTS="; W; GOTO 660
640 PRINT " POINTS/SIDE="; N; GOTO 660
650 PRINT " TOP="; T; " SIDE="; S;
660 PRINT " START="; ST$: " SKIP="; SK - 1
670 PRINT "ADD MORE LINES?-->";
680 GET A$: PRINT A$: IF A$ = "Y" THEN 410
690 IF A$ < > "N" THEN PRINT G$: PRINT : GOTO 670
700 PRINT : PRINT : PRINT "DO YOU WISH TO SAVE THIS DESIGN?-->";
710 GET A$: PRINT A$: IF A$ = "Y" THEN 810
720 IF A$ < > "N" THEN PRINT G$: PRINT : GOTO 700
730 PRINT : PRINT : PRINT "DO ANOTHER PATTERN?-->";
740 GET A$: PRINT A$: IF A$ = "N" THEN TEXT : HOME : END
750 IF A$ < > "Y" THEN PRINT G$: PRINT : GOTO 730
760 PRINT : PRINT : PRINT "DO YOU WISH TO USE THE SAME BEGINNING"
770 PRINT "FIGURE?-->";
780 GET A$: PRINT A$: IF A$ = "Y" THEN TEXT : HOME : GOTO 390
790 IF A$ < > "N" THEN PRINT G$: PRINT : GOTO 760
800 TEXT : HOME : GOTO 80
810 PRINT : PRINT : INPUT "WHAT IS THE NAME OF THE DESIGN?-->"; B$
820 PRINT CHR$ (4); "BSAVE "; B$; ", A$2000, L$2000": GOTO 670

```

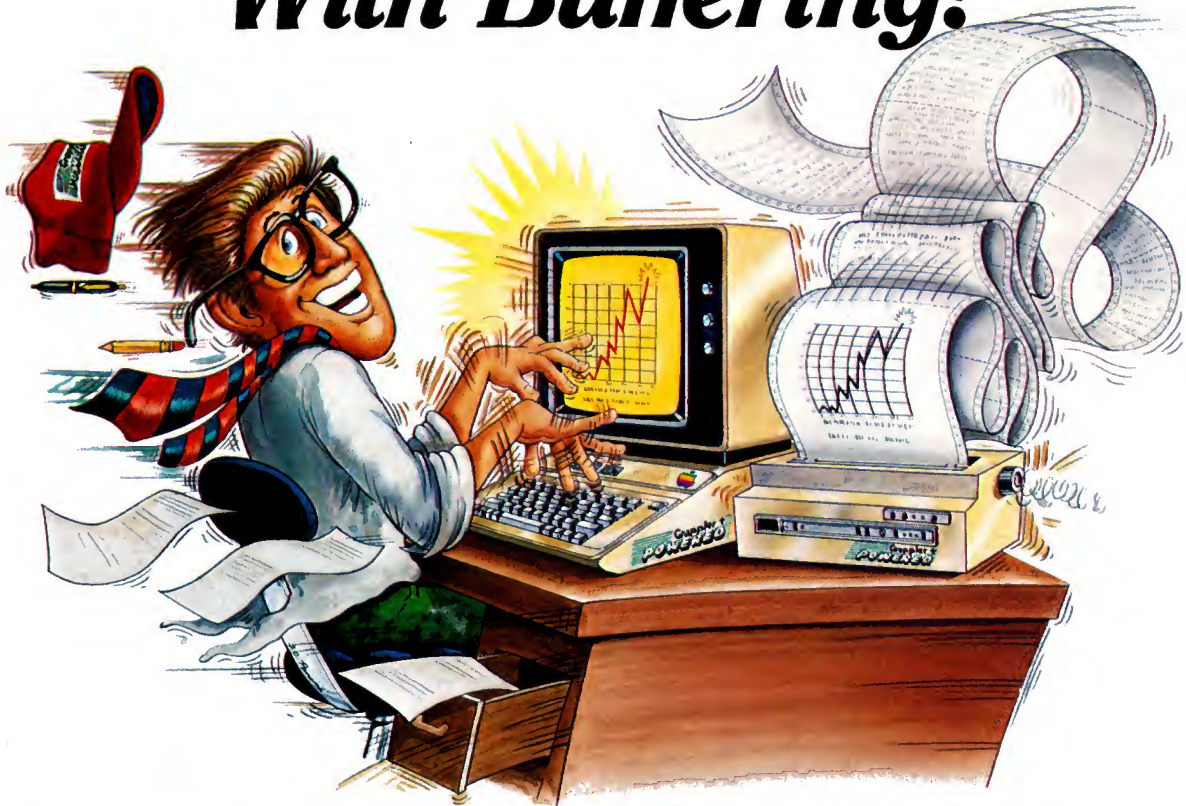
Listing 2. Display Designs.

```

10 TEXT : HOME : POKE 32, 8: VTAB 7
20 ONERR GOTO 120
30 PRINT "WHAT IS THE NAME OF THE"
40 PRINT "DESIGN YOU WISH TO SEE?"
50 PRINT : INPUT "-->"; A$
60 PRINT CHR$ (4); "BLOAD "; A$
70 POKE - 16304, 0: POKE - 16300, 0
80 POKE - 16297, 0: POKE - 16301, 0
90 VTAB 21: INPUT "ANOTHER?-->"; A$
100 IF A$ = "Y" THEN 10
110 TEXT : HOME : END
120 E = PEEK (222)
130 IF E < > 6 THEN TEXT : END
140 PRINT CHR$ (7): PRINT
150 PRINT "FILE NOT FOUND"
160 FOR I = 1 TO 3000: NEXT : GOTO 10

```


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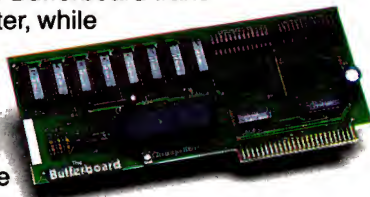
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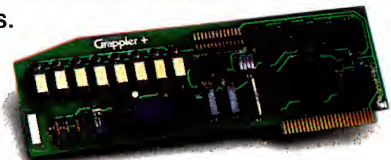
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The Compleat Text File Primer

Part 2—The Memory

We continue our series with a look at
RAM, ROM, and variables.

by Lee Swoboda

As the song says, "Memories are made of this." In Part 1 of this series of articles on Apple II and IIe text files, we examined one form of memory—the disk. Disks are *non-volatile* memory—if the power is turned off, the disk still remembers. This type of memory is useful for making a permanent record of programs or data.

When we say we have a 48K Apple, the 48K is *volatile* memory. This 48K is usually referred to as RAM or Random Access Memory. This is a misnomer, since some types of non-volatile memory can also be randomly accessed. Confused? The problem is that we are mixing apples and oranges. Computer memory has a number of characteristics; among them are volatility, function and access method.

Volatility

The 48K bytes of RAM in the Apple II and IIe are volatile; when the power is turned off, the memory goes blank. The Apple also contains 16K bytes of Read-Only Memory (ROM). ROM and the floppy disk are non-volatile memory. When the power is off, they retain their memory. Applesoft Basic is stored in ROM; the Disk Operating System (DOS) is stored in RAM. When the power is turned on, Applesoft is ready to use; DOS must be recalled from the disk.

Function

Read-only memory is permanently programmed. The computer can read and use the program in a ROM, but it cannot alter the programming. While this type of memory is useful for pro-

gramming that will be used repeatedly (such as Applesoft Basic), it is of no use for programs or values that must change. The computer also contains read/write memory, which the computer can read or use or you can change to suit some other purpose. When you enter (or load from disk) and run a Basic program, the computer is using read/write memory to store the program and to store the values it is calculating.

Access Method

Computer memory is a collection of bytes arranged in a specific pattern so that the computer can access the information. If the computer accesses memory sequentially, it starts at the beginning point of its memory and continues one step at a time until it finds the data it wants. The computer can also access memory randomly. That is, the computer determines the location of the data it wants and goes directly to that location, without having to go through other locations. All of the memory in the Apple II and IIe is random access. The disk is mostly sequential access. Figure 1 compares the three kinds of memory.

Memory Arrangement

Figure 2 is a map of the memory of a 48K Apple with a disk drive. This represents 64K ($2^{16} = 65536$ bytes) of memory. The blocks marked "input/output," "Applesoft Basic" and "auto-start ROM" are the 16K of Read-Only Memory we discussed previously. The blocks marked "monitor," "text screen" and "DOS" are part of the Ap-

ple's overhead and therefore not available for programming. This leaves the memory addresses from the top of the text screen (address 2052) to the bottom of DOS (38400), or about 36K, as user memory. Do I mean only 36K of the 64K that you paid good money for is available to write programs? Yup. But on the other hand, if you didn't let the computer use that 28K, you wouldn't have any Basic language, text screen, keyboard or disk drive; so don't complain. Actually, that remaining 36K doesn't belong to you totally; you must share it with the computer. As Figure 2 shows, the computer uses the memory area between your Basic program and DOS to store variables, arrays and strings. The Apple's operating system does this automatically. Since RAM is limited, you cannot waste it. You need to know the Apple's memory management to design efficient programs. Let's examine where Apple stores its information.

Variables

Applesoft Basic allows two classes of variables: simple and array. It also allows three types of variables within each class: real, integer and string. The symbols for the three types of simple variables are X (real), X% (integer) and X\$ (string). Corresponding symbols for array variables are X(Y), X%(Y) and X\$(Y), where Y represents the dimension of a single dimension array. So X% is a simple integer variable, X%(Y) is an

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	Volatility	Function	Access Method
Disk	Non-volatile	Read/write	Sequential access
ROM	Non-volatile	Read only	Random access
RAM	Volatile	Read/write	Random access

Figure 1. Comparison of the types of memory available in the Apple II and IIe.

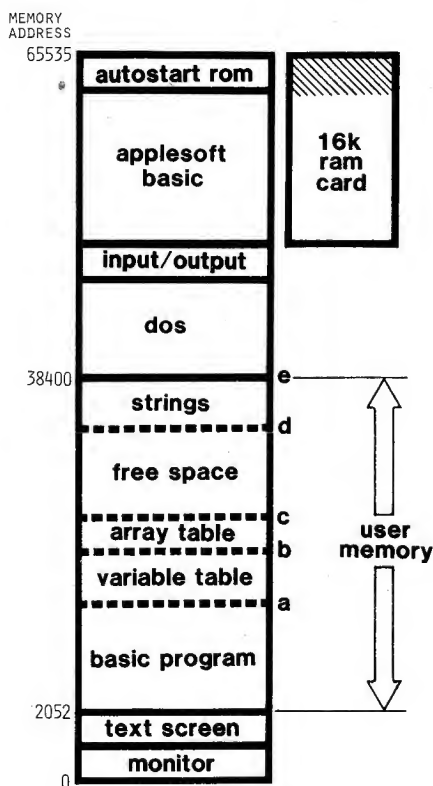


Figure 2. A map of the Apple II's memory.

Point	Location	Value
a	$\text{PEEK}(105) + 256 \cdot \text{PEEK}(106)$	Top of Applesoft program. Bottom of variable table. LOMEM:
b	$\text{PEEK}(107) + 256 \cdot \text{PEEK}(108)$	Top of variable table. Bottom of array table.
c	$\text{PEEK}(109) + 256 \cdot \text{PEEK}(110)$	Top of array table. Bottom of free space.
d	$\text{PEEK}(111) + 256 \cdot \text{PEEK}(112)$	Top of string storage. Top of free space.
e	$\text{PEEK}(115) + 256 \cdot \text{PEEK}(116)$	Bottom of string storage. Bottom of DOS (default value). HIMEM:

Figure 3. Memory locations of simple and array variables and strings.

integer array, and so forth. Even though I have named each of these variables X, Applesoft recognizes them as six distinct variables. Applesoft allows variable names of up to 255 characters, with three provisos:

- 1) the name must begin with an alphabetic character;
- 2) the remaining characters in the name must have ASCII values from 1-31 or from 48-90; and
- 3) the name may not contain any reserved words (see page 122 of *The Applesoft Manual*).

Applesoft distinguishes between variable names by using only the first two characters in the name. BUZZ and BUZZ% would be recognized as distinct because, even though they have the same name, one is a real variable and one is an integer. BUZZ and BUS would not be recognized as distinct because both start with BU and both are real variables.

Format

Simple and array variables and strings are stored in separate locations in memory, as Figure 2 shows. Simple variables are stored beginning at the end of your Basic program and building upward in a variable table (from point *a* to point *b* in Figure 2). Array variables are stored beginning where simple variables end and building upward in an array table (from point *b* to point *c*). Strings—not the variable itself, but the string that the variable represents—are stored beginning just below DOS and building downward (from point *e* to point *d*). The variable name and other data are stored in the variable table or array table. The points at which these tables start and stop are stored in memory so that the Apple knows where they are. The points marked *a*–*e* in Figure 2 may be determined as shown in Figure 3.

We can now examine the memory to see what variables look like to the Apple. First, let's look at simple variables. Enter the following Applesoft program lines:

```
20 L = PEEK (105) + 256 * PEEK (106)
30 HOME
50 FOR I = L TO L + 6
60 PRINT PEEK (I); " ";
70 NEXT I
80 PRINT
```




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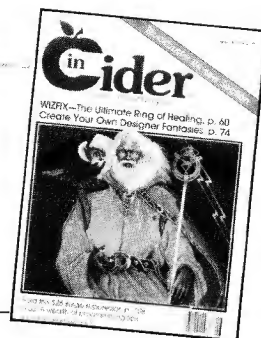
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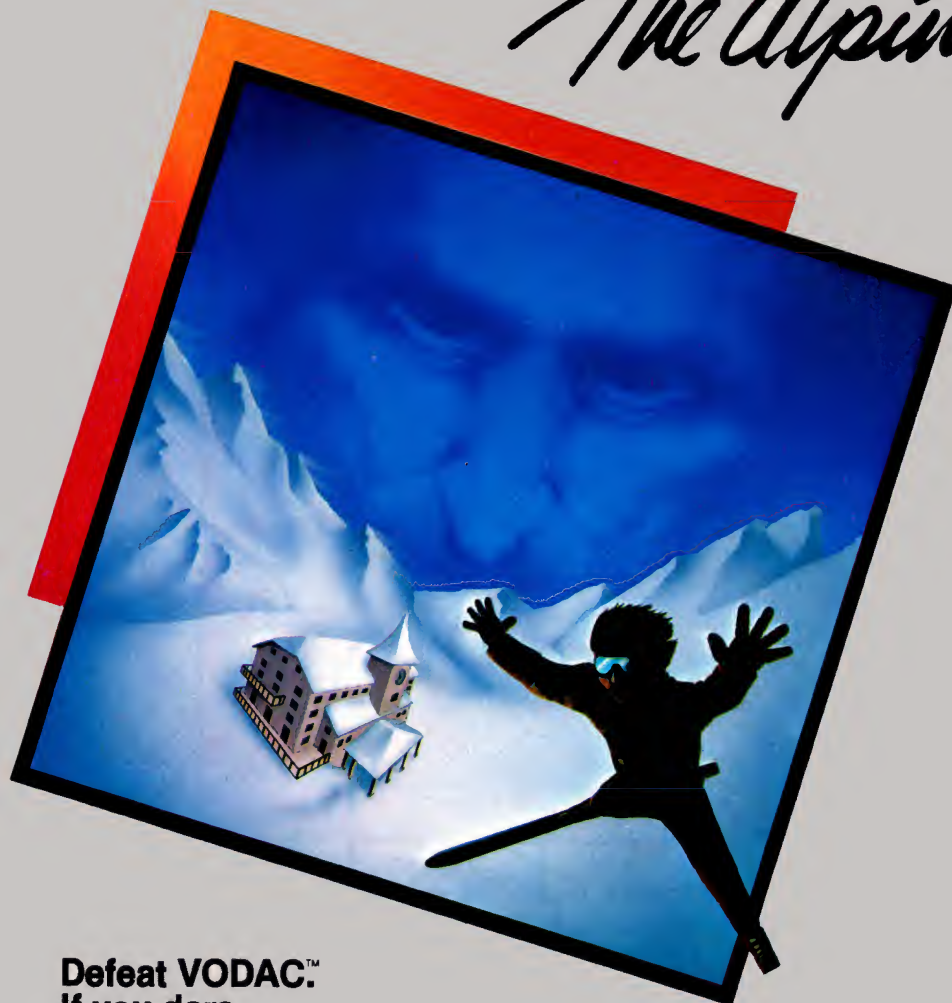
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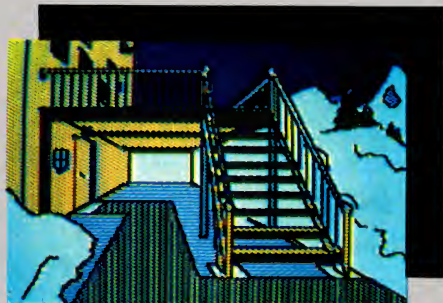
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Now let's experiment with different variables. Enter the following line groups, one group at a time, and run each group. Figure 4 shows the results you should obtain.

```

Group 1: 10 A = 1      Group 4: 10 A % = 1
          40 A = 1      40 A % = - 1
Group 2: 10 A = 1      Group 5: 10 A $ = "A"
          40 A = - 1    40 A $ = "A"
Group 3: 10 A % = 1    Group 6: 10 A $ = "A"
          40 A % = 1    40 A $ = "A" + "A"
  
```

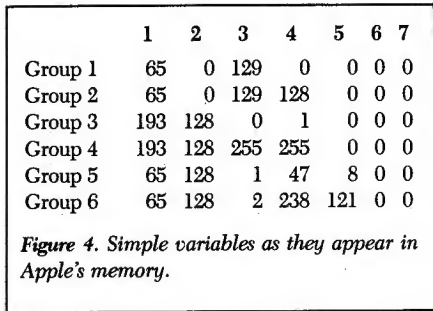
Now, what does all this mean? First, note that Applesoft uses seven bytes to store each variable, represented by the seven columns in Figure 4. Figure 5 summarizes the use of those seven bytes for each of the three types of simple variables.

The first two columns are the variable name. This is why Applesoft recognizes only two-character variable names. Note that even though we used A for all our variables, the values representing these names are different for each type of variable. This is how Applesoft recognizes the variable type. The value for the name appears in seven bits of the byte. The Most Significant Bit (MSB) is either high (1) or low (0), depending on the variable type. The low-byte values are ASCII (ASCII for A is 65), and the high-byte values are 128 plus ASCII (128 + 65 = 193). Therefore, the allowable variable names are designated as follows (refer to Figure 4):

Real	MSB low	MSB low
(Groups 1 and 2, Columns 1 and 2)		
Integer	MSB high	MSB high
(Groups 3 and 4, Columns 1 and 2)		
String	MSB low	MSB high
(Groups 5 and 6, Columns 1 and 2)		

The meaning of the values in the remaining five columns in Figure 4 depends on the type of variable.

Groups 1 and 2 in Figure 4 are real



numbers. Columns 3 through 7 represent the numeric values of these numbers in a "normalized" format. Column 3 is the exponent. The MSB of the exponent is high for positive exponents (as in our examples) and low for negative exponents.

Columns 4-7 represent the value (mantissa) of the number. The MSB is high for negative numbers and low for

ger numbers is much simpler, but then integers are much simpler numbers. Columns 3 and 4 are the value; columns 5 through 7 are not used and are always zero. Again, the MSB of column 3 is high for negative numbers and low for positive. The value of the number is 256*column 3 + column 4. Since only 15 bits are available, if the value is greater than 32767 ($2^{15} - 1$) then subtract 65536 (2^{16}).

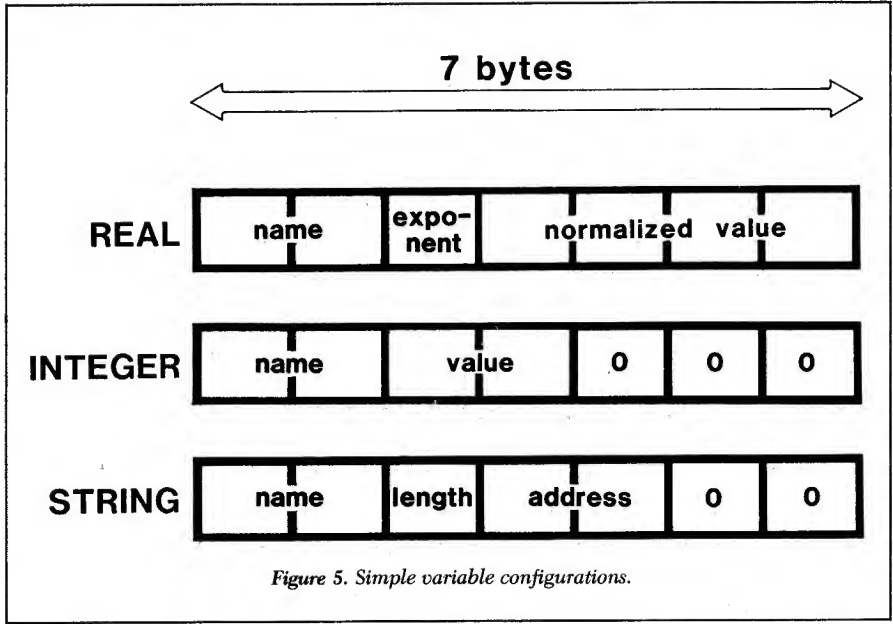
String Variables

The string itself is not stored in the variable table. Instead, Applesoft records the length and location of the string in the variable table and stores the string itself at the top of memory. In Figure 4, Groups 5 and 6, column 3 is the length of the string and columns 4 and 5 are the address of the location in memory at which the string starts. Group 5 is a declared string—one which is stated specifically in the Basic program (40 A\$ = "A"). In this case, the variable table points to address 2095 ($47 + 256 \times 8$), which is the location within the Basic program occupied by the expression "A". In Group 6, the situation is different in that A\$ is concatenated from two strings. Applesoft stores the new string ("AA") up in the top of available memory and places the address of that new string in the variable table. In Figure 3, the Group 6 string is stored starting at address

"Applesoft records the length and location of the string in the variable table and stores the string itself at the top of memory."

positive (the opposite of the exponent). The remaining 31 bits designate descending powers of two, the left bit being 2^{31} , the next 2^{30} , 2^{29} , 2^{28} , and so on. Applesoft divides the value of the variable into powers of two and sets each of the 31 bits accordingly.

Groups 3 and 4 in Figure 4 are integer numbers. Representation of inte-



31214 (238 + 256 × 121).

Applesoft stores all three types of simple variables in seven-byte blocks in the variable table. It distinguishes between the types by determining which of the MSBs is high in the name bytes. When a Basic program uses a variable, the computer searches through the variable table for the current value of the variable, beginning at the low end and skipping upward seven bytes at a time until it finds the correct name.

String Arrays

Now let's examine how Applesoft represents string arrays. Figure 6 shows how strings are represented in the array table. Real and integer arrays are represented similarly, but we are interested primarily in strings. Note that we no longer have only seven bytes per variable. In fact, the length required for each array depends on the number and size of the dimensions. Technically, Applesoft does not limit the number and size of these dimensions, but there are some practical limits.

Applesoft uses dynamic array di-

mensioning. This means that we do not have to declare the dimensions of an array if the array is one-dimensional (it has one subscript) and the array contains fewer than 11 elements. The first two bytes are again the variable name, using the same naming convention as simple variables. The next two bytes are the offset, which represent the memory location of the name of the next array in the table. The fifth byte contains the number of dimensions in the array up to 255, since one byte has a maximum numeric value of 255. We would run out of memory before the array got that large, anyway. Next in the array table is a series of two-byte values for each dimension of the array, Nth dimension first. If you do not declare a value, the computer will automatically assign a value of 11 (a subscript value of 10 plus the zero element).

The remaining bytes in the array table are the length and address of each element in the array. This is identical to the same three-byte series for the simple variable, but each element in the array must have three bytes,

whether or not any string is present. This sets a practical limit on the number and size of the dimensions.

Enter the following lines (don't forget to enter NEW to clear out the old program):

```
10 L=0:E=0:I=0
20 L=PEEK(107)+256*PEEK(108)
40 E=PEEK(109)+256*PEEK(110)-1
50 HOME
60 FOR I=L TO E
70 PRINT PEEK(I); " ";
80 NEXT I
90 PRINT
```

Now add the following lines one at a time and run the program. The values shown in Figure 7 should appear on-screen.

```
Line 1: 30 A$(1)="A"
Line 2: 30 DIM A$(2)
Line 3: 30 DIM A$(2,2)
```

Line 1 is a default; we let the computer assign the array dimension, so it selected 11 (column 7 of line 1 of Figure 7). This array consumes 40 bytes in the array table (columns 3 and 4). If we are going to use only one or two elements of the array, then we have wasted a lot of valuable memory space with those zeros. Column 5 shows that we have a one-dimensional array. Columns 8, 9 and 10 are zero because we have not yet declared the 0th element. Column 11 is the length of the first element (0 means a null string). Columns 11 and 12 are the location of the string (52 + 256 × 8 = 2100).

Line 2 shows what happens when we assign a dimension of two to the array. The total length of the entry in the array table drops from 40 to 16 (column 3).

Line 3 shows the values for a two-dimensional array. Column 5 increases from one to two dimensions. The 3's in columns 7 and 9 show that the array's dimensions are both 3.

The trailing zeros in all array tables represent elements of the array which have not yet been assigned. Even though no strings have been assigned, the elements take up space in the array table as overhead. As we assign values to the strings, the overhead will increase by the length of the string.

The formula in Figure 6 represents

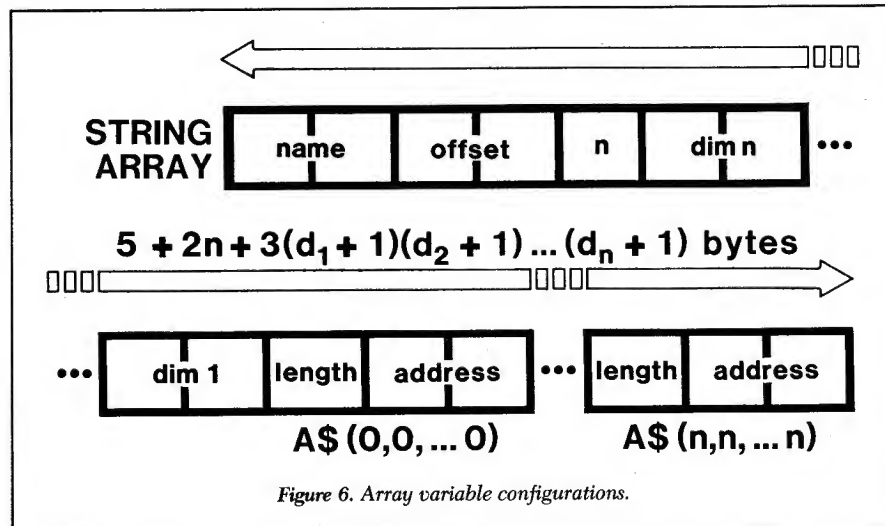


Figure 6. Array variable configurations.

	1	2	3	4	5	6	7	8	9	10	11	12
Line 1	65	128	40	0	1	0	11	0	0	0	0	52 8 ... (27 zeros)
Line 2	65	128	16	0	1	0	3	...	(9 zeros)			
Line 3	65	128	36	0	2	0	3	0	3	...	(27 zeros)	

Figure 7. Peeking into memory to compare length and address of different string arrays.

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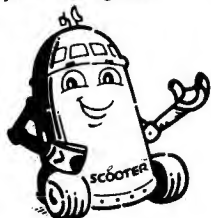
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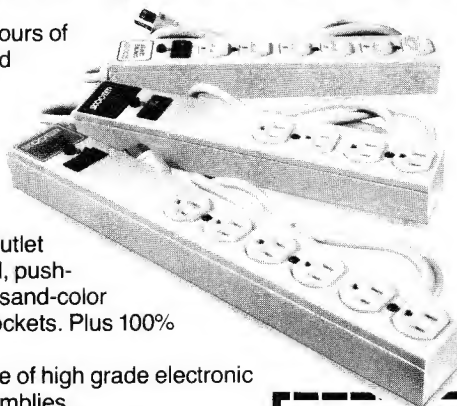
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the amount of overhead the array consumes in the array table. This results in substantial memory space allocation, particularly for multiple dimensioned arrays (a $10 \times 10 \times 10$ array contains 1000 elements). Figure 8 illustrates the overhead for A\$(10, 9, 8).

Garbage Collection

When Applesoft builds strings, it starts at the top of the available memory and builds downward (from point *e* to point *d* in Figure 2). Each successive string starts at the end of the previous string. In this manner, strings are stacked together nose to tail. When the computer creates a new value to replace the value of a string it had previously created, it begins at the end of the last string previously created, just as if this new value were an entirely new string. When the computer has

**"Applesoft is not
nearly the 'Model T'
language some claim
it is!"**

created the new value, it updates the variable or array table with the address of the newly created string, but it leaves the old string value in memory as an orphan. As a program creates new string values, point *d* of Figure 2 moves downward and large numbers of these orphaned strings are scattered about memory as "garbage." This is not a problem until the computer discovers that point *d* is so close to point *c* that it has no room to create any more strings. At this point, Applesoft "collects garbage." The computer goes through the string storage area, moving all valid strings to the top of the memory, again placing them nose to tail, and eliminating orphans. The price you must pay for this feature is that the computer takes control of itself while it is collecting. The cursor will disappear and the computer will not respond to the keyboard, sometimes for several minutes.

If this seems like an inconvenience, remember that the alternative to Applesoft's dynamic string allocation is to have to declare the length and dimension of all strings, as many Basics require. The latter method also generally limits the number of dimensions an array can have to one or, at the most, two. Applesoft is not nearly the "Model T" language some claim it is!

Let's see how this garbage collection works. Enter the following lines:

```
10 A$ = "":X$ = "XXXXX"
20 L = PEEK(105) + 256*PEEK(106)
30 E = L + 6
40 HOME
50 A$ = X$ + X$
60 GOSUB 1000
70 A$ = X$ + X$
80 GOSUB 1000
90 A$ = X$ + X$
100 GOSUB 1000
110 I = FRE(0)
120 GOSUB 1000
999 END
1000 FOR I = L TO E
1010 PRINT PEEK(I);";"
1020 NEXT I
1030 PRINT:PRINT:PRINT
1040 RETURN
```

Now run this program. You should see the following on-screen.

	1	2	3	4	5	6	7
65	128	10	246	191	0	0	
65	128	10	236	191	0	0	
65	128	10	226	191	0	0	
65	128	10	246	191	0	0	

Examine the values in columns 4 and 5. Lines 50, 70 and 90 all created the same string, A\$, which consisted of ten X's. It created the first string at address 49398 ($246 + 256 \times 191$), the second at 49388 and the third at 49378. The Apple would have continued this process until it ran out of memory, ex-

cept that line 110 used the command FRE(0). This forces the Apple to "clean house." Applesoft eliminated the orphan strings created in lines 50 and 70 and moved the latest value for A\$, created in line 70, up to the top of memory. Thus, the fourth series of values printed shows the string back where it started, at 49398.

Further Reading

For more information on Applesoft variables, see the following:

- Pages 62-65 of *Apple II User's Guide*.
- Pages 24-29 of *Programming the Apple*.
- "Real Variable Study" in *All About Applesoft*, published by A.P.P.L.E.
- "All About Variables," *Nibble*, Volume 3, Number 2.
- "How About Arrays," *Call A.P.P.L.E.*, April 1982.
- "Float, Float, Float Your Point (F. P. Representation)," *Apple Orchard*, Winter 1980.
- "Keeping Track of Variable Names in an Applesoft Program," *Creative Computing*, December 1982.
- *Applesoft Language*, Blackwood and Blackwood, Lessons 4, 11, 12, 13 and 26.
- "Dynamic Array Dimensioning," *Nibble*, Volume 1, Number 4.
- "Applesoft Variable Cruncher," *Nibble*, Volume 3, Number 4.

More to Come

Next month we will examine the Disk Operating System (DOS). It is the DOS that provides the means for the computer to store information on the disk. Save that in your memory. ■

Name, offset, number of dimensions	= 5 bytes
Values of each dimension (2 bytes \times 3 dimensions)	= 6
A\$(0, 0, 0)	}
.	}
.	} (3 bytes \times 11 elements \times
.	} 10 elements \times 9 elements)
	= 2970
A\$(10,9,8)	}
Total overhead	= 2981 bytes

Figure 8. We can consume memory rapidly if we want to build large arrays.

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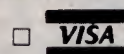
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—by W.D. Cowell—

One of the most powerful applications of your Apple is in accumulating tax data and preparing income tax forms. Figure 1 is an example of a customized tax form prepared using VisiCalc. A description of the development of the template for this printout can serve as an introduction to the use of VisiCalc, as well as being useful at tax time.

The printout was made in the compressed mode on a Prowriter printer. Most dot matrix printers have a similar print mode. The advantage of the compressed character set is that it allows printing a complete tax report on a single page. This crowds the printout somewhat, but I don't believe anyone will have any trouble reading it.

Only the tax schedule for couples filing jointly is shown, but the format would be similar for other tax categories. The idea is to build a template that fits your individual needs.

Anyone who has used VisiCalc at all is familiar with the commands to sum a column or to transfer a total from one cell to another, so I won't cover that aspect of the underlying template. Actually, only two techniques were used which may give a new user problems. The first is where an exclusion amount is subtracted from a subtotal such as that shown for dividends at cell C11. Subtracting the exclusion amount cannot result in a value less than 0. Therefore, the following formula should be entered in this cell:

`@IF((C9-C10)<0,0,C9-C10)`

If this formula is used, the total after exclusion will be shown as either 0 or the resulting value after subtracting the full allowable exclusion amount. A similar formula is used again where you subtract the exclusion amount when figuring medical deductions and an allowable casualty loss. Notice that, in the example, there was no casualty loss so the \$100 exclusion was not applicable and the correct value of 0 appears.

The next special technique is used in

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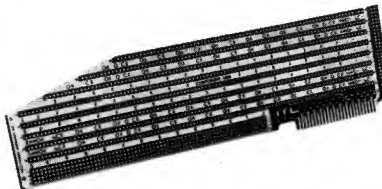
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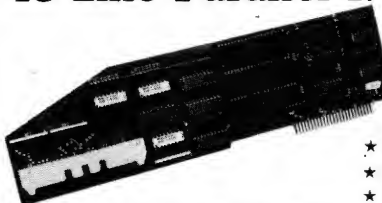
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14.13.	CAPITAL GAIN	846.00	!GLASSES	50	EXC 100	100				10.LEGAL			
15.18.	RENTS,PARTNERSH	3788.00	!7.TOTAL	1922	TOTAL	0				11.REPAIR	319.00	180.00	380.00
16.21.	OTHER	950.00	!8.3/L32	1094						12.SUPPL	18.00		
17.22.	TOTAL INCOME	38454.00	!9.LN7-8	828	MISC. DEDUCTIONS					13.TAXES	780.00	568.00	760.00
18.			!0.TOT M	828	UNION	81				14.UTILIT	165.00		
19.	ADJUSTMENTS				TAX PRP					15.WAGES			
20.25.	IRA	2000.00	! TAXES		PROF PU	35				16.OTHER	55.00		
21.30.	OTHER		! STATE		PROF FE	225							
22.31.	TOTAL ADJUSTS	2000.00	! RE TAX	865	BS AUTO	541				TOTAL DED	2726.00	3227.00	2896.00
23.32.	ADJUSTED GROSS	36454.00			P LICEN	68				DEPRECIAT	1440.00	1540.00	1385.00
24.			! SALES	466	TOTAL	950				TOTAL	4166.00	4767.00	4281.00
25.	TAX COMPUTATION		! OTHER	108						NET INCOM	634.00	-1167	-1581.00
26.	LINE 32	36454.00	! TOTAL	1439	SUMMARY OF DEDUCT					LINE 25 TOTAL RENTAL INC		-2114	
27.	ITEMIZED DEDUCTS	2056.38			MEDICAL	828				LINE 29 PARTNERSHIP INCOM		5902	
28.	INCOME LESS DEDUCT	34397.62	INTEREST		INTEREST	1439				LINE 37 TOTAL SUPPLEMENTAL		3788.00	
29.	LESS DEPENDENTS	-5000.00	HOME 372		TAXES	991							
30.	TAXABLE INCOME	29398	CD CARD 270		CONTRIB	148							
31.			OTHER 17		CASUALT	0							
32.			" 125		MISC D	950							
33.	TAX RATE-MARRIED		CR UNION 207		TOTAL	4356							
34.			TOTAL 991		MARRIED	2300							
35.	BASE AMT	3656			NET DED	2056							
36.	DELTA %	.26											
37.	83 TAX	4903											
38.													
39.	7600.01	504 .15	7600										
40.	11900.01	1149 .17	11900										
41.	16000.01	1846 .19	16000										
42.	20200.01	2644 .23	20200										
43.	24600.01	3656 .26	24600										
44.	29900.01	5034 .3	29900										
45.	35200.01	6624 .35	35200										
46.	45800.01	10334 .4	45800										
	60000.01	16014 .44	60000										

Figure. Tax form prepared using VisiCalc.

figuring the actual total tax for the appropriate tax bracket. The technique is known as "table lookup." Shown in cells 39-46 of the Figure is part of the tax table for a married couple filing a joint return. Develop a similar table for your specific tax category. The table should cover the full range of the individual's potential tax brackets. The last three columns of these cells come directly from a tax table applicable for 1983. The second column is the base tax amount for a taxable income of at least the amount shown in the fourth column. The decimal figure in the third column is the incremental tax rate for all taxable income above the base amount (the second column) until you reach the next tax bracket. The first column is included as one method of assuring that the taxable amount computed is derived from the appropriate tax bracket up to and including the maximum for the bracket. The formulas are as follows:

For the base tax amount (cell B35):
 @LOOKUP(C30,A39...A46)
 For the delta percent (cell B36):
 @LOOKUP(B35,B29...B46)

For the total tax (cell B37):
 + B35 + (B36*(C30 - @LOOKUP(B36, C39...C46)))

The taxable income shown in C30 of the example is \$35,497, yielding a base tax amount of \$5574. This base amount then becomes the LOOKUP value (B35), which gives the delta percent used to compute the incremental tax amount. In the third formula the base amount (B35) is added to the calculated delta amount for the total tax.

The values computed using this table will have to be replaced with the values shown in the IRS tax table. For 1983 their table covers taxable incomes up to \$50,000. The computed values should be close approximations and are automatically adjusted as you correct or change any input values. This makes it easy to assess the impact of something like a last-minute deposit to an IRA account.

VisiCalc calculates across and down by row and column. Therefore, a value changed in a cell to the right and below where it is used on page one of the tax form will not be picked up without a recalculation ("!") command. ■

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The Computer Literacy Revolution

Computers have challenged the educational community to make every child computer literate. Schools now must answer the call.

by Molly Watt

Literacy is the educational computing buzz word of 1984. Every school is putting its literacy curriculum in the forefront. Every educator is faced with creating a computer-literate student body. The computer revolution has pushed a new agenda onto the schools. Few were prepared to meet this challenge and many are actively resisting it.

The last revolution I participated in was during the sixties. School budgets were expanding and educators embraced new technology. They learned to use film loop projectors, word machines, overhead projectors and televisions. They developed new science and math curricula to involve the student in the process of being a scientist or mathematician, rather than memorizing formulas and facts. Now these machines have been abandoned in favor of flash cards for facts and data.

Educators are held accountable for educational goals, objectives, evaluation forms, and testing. They were burned before and the intense heat of public attention makes them cautious now. Some think that computers are only a fad. They are waiting until this craze passes on. They will not be fiscally irresponsible, nor hyped, nor waste their time learning what will soon be outmoded. Resistance blooms in the hearts of some excellent educators.

Meanwhile, many parents and teachers have come down with computer mania. These folks may have borrowed a computer for the weekend to finish up some work, or they may have started through curiosity. Some may even have grasped the potential impact of micros on our society. Sitting

down at the computer is something that has become comfortable, commonplace and important for them. Their productivity has become linked to their access to a micro. Those with computer mania have great difficulty recognizing and appreciating the educators' position.

Reading and Writing Literacy

For many years I taught kindergarten, first and second grade literacy skills—the reading and writing variety. I taught letter recognition and formation, and story writing. My students did learn to read and write, but I don't believe that their learning was solely dependent on me.

I was teaching reading and writing in a culture of literacy. Our whole society reads and writes, and expects that everyone does. My students sat on their parents' knees and listened to nursery tales. They knew how to look up the time of their favorite television show. They could sign their name to take out a library book. Walking to school they passed signs for "pizza" and waited for the crosswalk to light up "walk." Sometimes I sent a student with a note to see the school cook, and she would return with cupcakes. Students wrote invitations to the school custodian to watch a play or hear a story, and he came. Reading and writing is pervasive in our society and everyone does it. Children see its importance and every adult supports the idea that each child will learn too.

Computer Literacy

Suddenly teachers are required to teach computer literacy. What it is,

few agree. How it is done, no one knows with certainty. Most teachers did not know about computers in their own childhood, nor did they know anyone who used a computer. Until recently they had never used a computer for any purpose. Teachers do not have a sense of what computers are, nor what they can do with them.

This is not a criticism of educators. It is simply a description of what is true for many. They are not surrounded by a computer culture where they can learn about computers, nor are their students. It is all new. For some teachers, this is an exciting challenge, for others it is terrifying.

Communities are pushing teachers to set goals and objectives for a computer curriculum that doesn't exist yet. They are being asked to evaluate their programs and prepare students to take standardized tests. Teachers are used to feeling that they know their subject. With computer literacy, most do not know very much and cannot state this openly and honestly.

We need to learn from our experiences in the sixties, not to repeat the problem, but to succeed. In the sixties, few recognized how difficult it is to change, how much teacher support and training in an ongoing way is needed.

Supporting Schools

If schools are serious about ensuring computer literacy among their students, they must also be serious about

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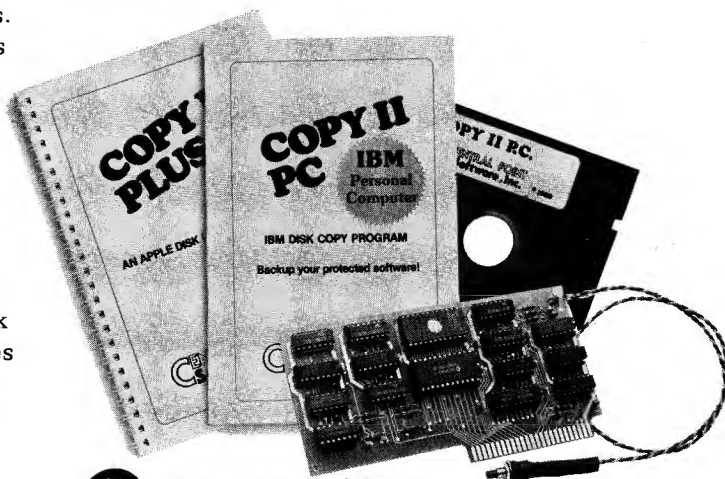
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making the opportunities for computer literacy available to staff as well. Trust and support rather than push and prod should be the keynotes. This means allowing enough time, taking a long view of the process. It means providing computer time on periods off, such as take-home computers for weekends and vacations. It means giving permission for teachers to find out by playing and trying ideas. It means providing a resource teacher to support the process. It means raising money for more hardware and more personnel. It means volunteering to show kids and teachers what you know. After all, a computer-literate society is one with enough combined experience in using computers to appreciate that literacy is a long, ongoing process of continual embellishment and debugging. Growing a culture of computer literacy is an important task which those who appreciate the value of computers must do carefully. ■

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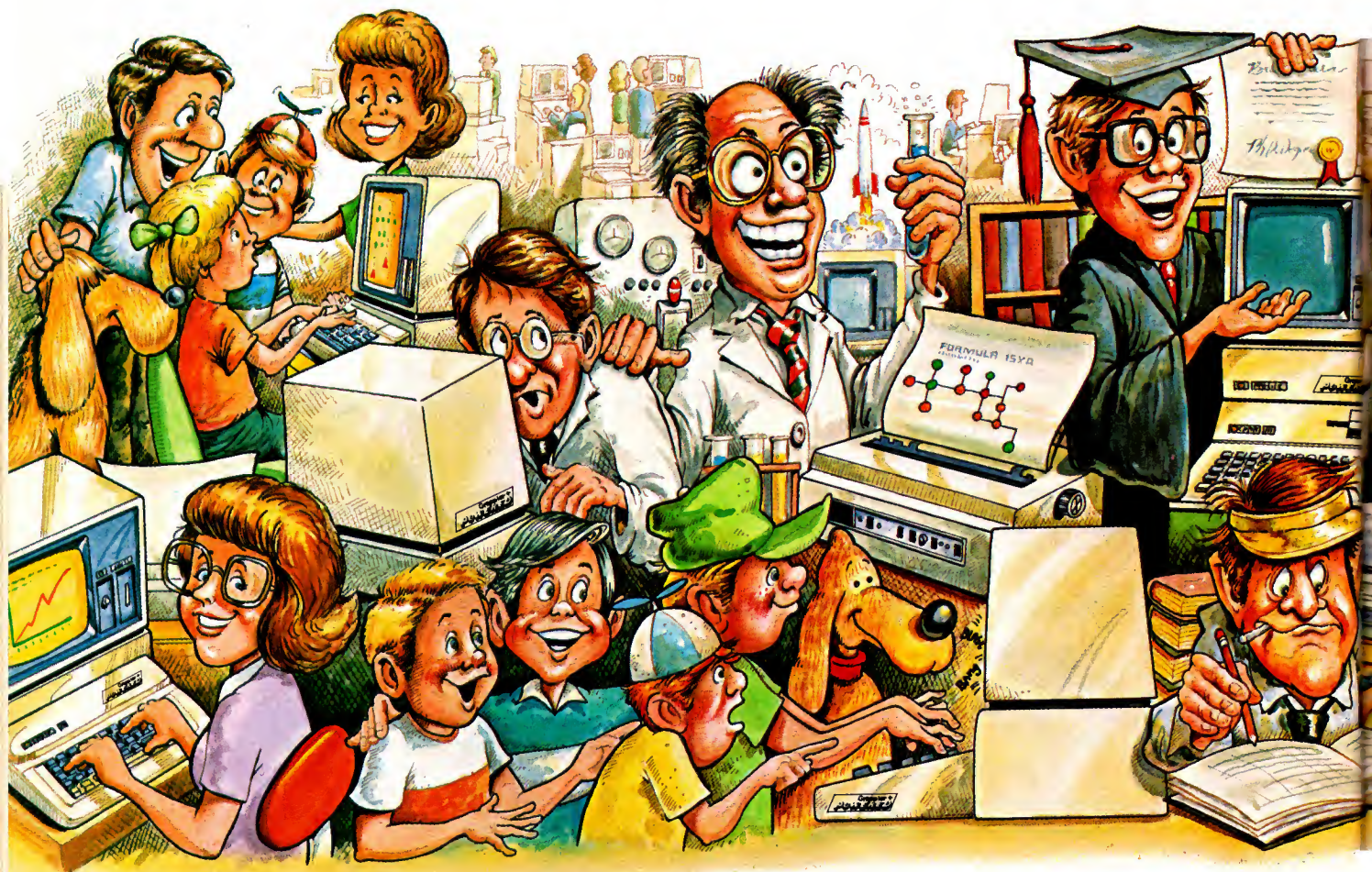
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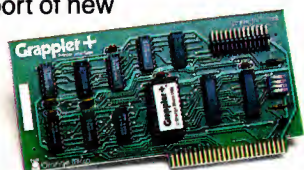
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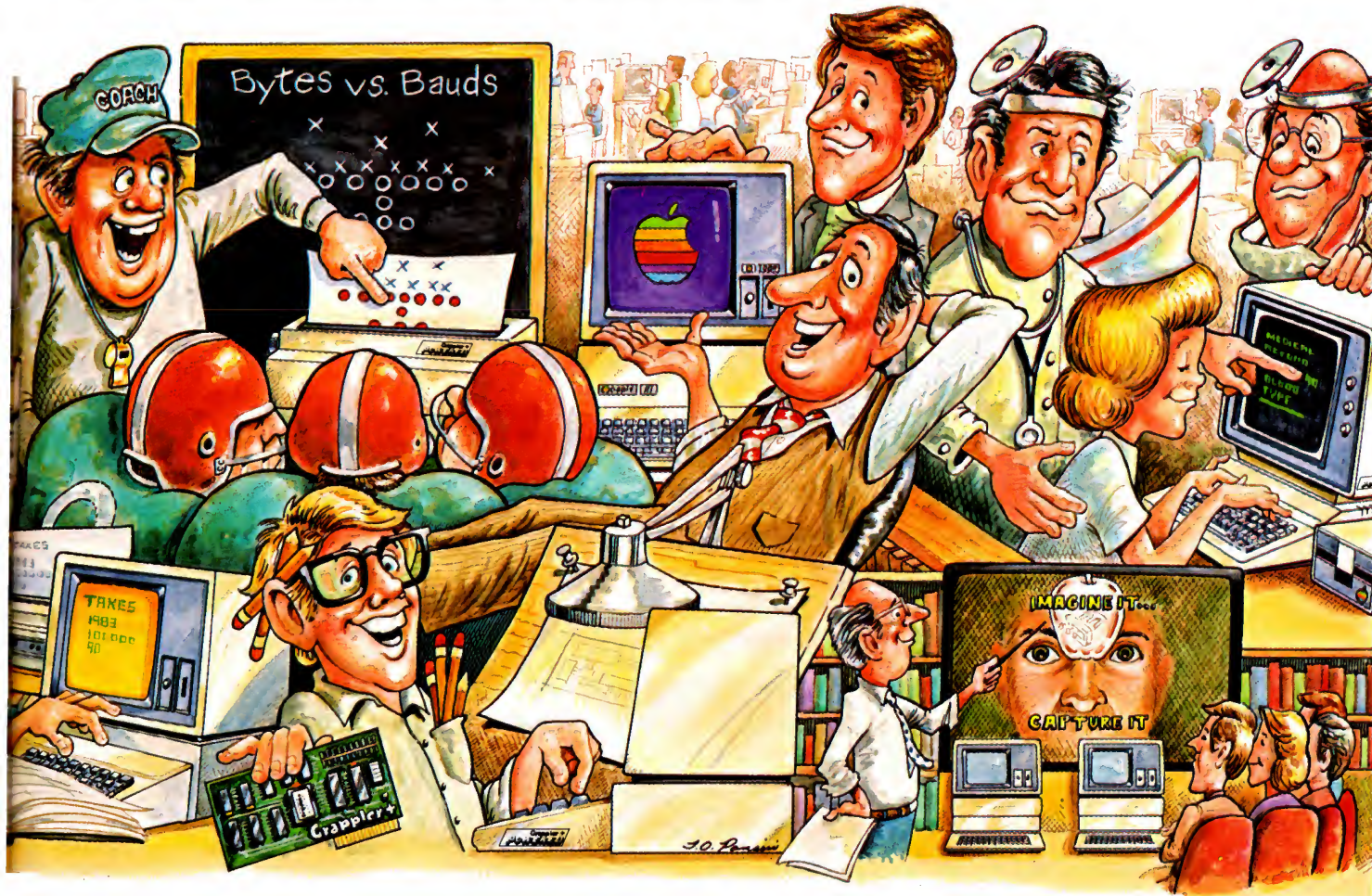
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by Clark R. Karr

The ASCII character set provides most of our everyday written language symbols. However, it is not complete when we get into more specialized character sets. For example, mathematics uses a variety of special symbols.

I have developed some general routines that allow the use of the graphics screen as a text screen. The programs can be used for technical writing as well as for less formal text and games.

The WSTRING and WCHAR character bit maps for all the ASCII codes are stored in a file called SYSTEM.CHARSET. This file contains control characters—original pictures for the ASCII codes. The characters include miniature chess pieces, card suit symbols, an Apple apple, a diskette, and some mathematical symbols—32 unique symbols for the ASCII codes 0–31. If one of these ASCII codes is output to the graphics screen through WSTRING or WCHAR, one of these pictures appears rather than the expected control function.

Listing 1 shows the unit 'GrafText', which contains 13 procedures that position text within the graphics screen as if it were a 40-column-by-24-line text screen, along with two procedures for inputting characters and strings from the graphics screen. Listing 2 shows the program 'ChngChar', which dem-

Listing 1. Unit 'GrafText'.

```
[{$+}]
Unit GrafText;

Interface
  Uses Turtlegraphics;
  Type Valid_Entry = Set of Char;

  Procedure gHome;
  Procedure gClear;
  Procedure gAt (X,Y:integer);
  Procedure gHtab (column:integer);
  Procedure gVtab (line:integer);
  Procedure gCenter (Strng:String);
  Procedure gUp (lines:integer);
  Procedure gDown (lines:integer);
  Procedure gRight (columns:integer);
  Procedure gLeft (columns:integer);
  Procedure gCursor(var X,Y:integer);
  Procedure gFillField (Len:integer;ch:char);
  Procedure gReep;
  Procedure gWait (timer: integer);
  Procedure gGet_Char (Prompt:string;var Ans:Char;Legal_Entries:Valid_Entries);
  Procedure gGet_String (Prompt:string; Len:integer; var Ans:String);

Implementation

Const Ymax = 183; Xmax = 279; {pixels}
      MaxLines = 23; MaxColumns = 39;
      FirstLine = 0; FirstColumn = 0;

Var dummy:integer;

Procedure CheckXY (var X,Y:integer);
Begin
  If X < FirstColumn then X:=FirstColumn;
  If X > MaxColumn then X:=MaxColumn;
  If Y < FirstLine then Y:=FirstLine;
  If Y > MaxLines then Y:=MaxColumn
End;

Procedure gHome;
Begin
  Pencilor(none);
  Moveto (0,Ymax)
End;

Procedure gClear;
Begin
  InitTurtle;
  Moveto (0,Ymax)
End;

Procedure gAt; (X,Y:integer)
Begin
  CheckXY (X,Y);
  Pencilor (none);
  Moveto (7*X,Ymax-Y*8);
  If turtleY<0 then moveto(turtleX,0)
End;
```

Listing 1 continued.

Listing 1 continued.

```

Procedure gHtab; {column:integer}
Begin
  CheckXY (column,dummy);
  Pencilor (none);
  Moveto (7*column,TurtleY)
End;

Procedure gVtab; {line:integer}
Begin
  CheckXY (dummy,line);
  Pencilor (none);
  Moveto (TurtleX,Ymax-line*8);
  If turtleY<0 then moveto(turtleX,0)
End;

Procedure gCenter; {Strng:string}
Const Mid = 20;
Var Skip : integer;
Begin
  Skip:=Mid-(Length(Strng) div 2);
  gHtab(Skip);
  Wstring(Strng)
End;

Procedure gUp; {lines}
Begin
  Pencilor(none);
  Turnto(90);
  Move(lines*8)
End;

Procedure gDown; {lines}
Begin
  Pencilor(none);
  Turnto(270);
  Move(lines*8);
  If turtleY<0 then moveto(turtleX,0)
End;

Procedure gRight; {columns}
Begin
  Pencilor(none);
  Turnto(0);
  Move(columns*7)
End;

Procedure gLeft; {columns}
Begin
  Pencilor(none);
  Turnto(180);
  Move(columns*7)
End;

Procedure gCursor; {var X,Y:integer}
Begin
  X:=TurtleX div 7;
  Y:=MaxLines - (TurtleY+1) div 8;
  CheckXY(X,Y)
End;

Procedure gFillField; {Len:integer; ch:char}
Var i:integer;
Begin
  For i:=1 to Len do Wchar(ch)
End;

Procedure gBeep;
Begin
  Write (Chr(7))
End;

Procedure gWait; {timer:integer}
Var i,j:integer;
Begin
  For i:=1 to timer do
    For j:=1 to timer do;
End;

Procedure gGet_Char;{Prompt:string;var Ans:Char;Legal_Entries:Valid_Entry}
Var Entry:Char;
    Error_Message:string;
    OldX, OldY:integer;
Begin
  Error_Message:='Not a valid entry. Try again.';
  gCursor(OldX,OldY);
  Repeat
    Wstring(Prompt);Wstring(' [ ]');gLeft(2);
    UnitClear(1);
    Read(Entry);Wchar(Entry);
    If not (Entry in Legal_Entries) then begin
      If Entry in ['a'..'z'] then Entry:=Chr(Ord(Entry)-32);
      If not (Entry in Legal_Entries) then begin
        gBeep;gHome; gCenter(Error_Message);gWait(5);gBeep;
        gHome;gFillField(40,' ');
        gAt(OldX,OldY)
      end
    end
  Until Entry in Legal_Entries;
  Ans:=Entry
End;

```

Listing 1 continued.

onstrates the use of the GrafText procedures and allows the creation of unique bit maps for any of the ASCII codes. The unit 'GrafText' and program 'ChngChar' combined allow the use of the graphics screen as an interactive text screen in conjunction with its normal graphics capabilities and the use of unique character sets from the Apple keyboard.

The procedure names within GrafText begin with a lowercase 'g' to distinguish them from any similar procedures operating on the text screen. These procedures move the turtle as if it were the cursor in a 40-column, 24-line text screen with position 0,0 being the upper left corner. Briefly, here's each procedure:

1. gHome: moves the turtle to 0,0. Text output will appear at top of screen.
2. gClear: clears the screen and moves the turtle to 0,0. It can be used instead of InitTurtle.
3. gVtab and gHtab: move the turtle to the specified line (0-23) or column (0-39) respectively.
4. gAt: moves the turtle to the line and column specified.
5. gUp, gDown, gRight, and gLeft: move the turtle the specified character positions in said direction.
6. gCenter: centers the string in the current line of the screen.
7. gFillField: given length and a character, displays length number of character at the current position. It can be used to erase prompts, answers, and so on.
8. gGet-Char: first, displays the prompt passed to it; second, reads the character entry and displays the character to the screen; and third, checks the character against the set of allowed answers. If an unacceptable character is entered, an error message is displayed and the prompt is repeated for another attempt.
9. gGet-String: similar to gGet-Char except it processes string entries. First, the prompt is displayed. Second, a bracketed field is displayed to indicate the maximum length of allowed entry. Third, each character is analyzed, concatenated to the entry string, and then displayed. Left-arrows remove the previous character from the string and any entry with an Ord value of less

than space is considered a CR. The string is passed back to the calling procedure through a variable parameter.

gGet-String uses a variant record to switch each character entered back and forth between Type Char and Type String. The problem is that gGet-String needs first to accept each key-stroke of the entered string as a character variable in order to display the character as it is entered and to test its Ord value so that left-arrows and CRs can be handled correctly. Then it must concatenate each character, as a string of length 1, to a string variable. The variant record allows gGet-String to consider a single word to be either a string of length 1 or a packed character array, depending on which name is being used at the time. Clever.Str1 and Clever.Ch[1] are the two names for the character that has just been entered and is being processed. Clever.Ch[0] contains the length of Clever.Str1 and is initialized to 1 by setting Clever.Str1 to '' before accepting any character entries.

Because a CR is converted into a space when READING a character variable, a test for a CR cannot be made directly. Instead, gGet-String checks for EOLN being true as a test for a CR. Although ChngChar demonstrates most of the procedures in GrafText, its primary purpose is to allow redefinition of the ASCII codes' 7-by-8-bit arrays. The changes are made in System.CharSet, so make a backup of it if you want to revert back to the original pictures. Please note that the new pictures are not displayed after you change them in ChngChar; it is changing only System.CharSet. Rerunning ChngChar or any program using System.CharSet will display the new picture.

System.CharSet is an untyped file two blocks long; therefore, ChngChar reads the file into memory using BlockRead and writes it back to disk with BlockWrite. Each character image is stored in eight consecutive bytes. Each bit within each byte represents one pixel, except the most significant bit, which is ignored. This gives us the 7-by-8-bit array describing each character's picture by reploting the Ons and Offs within the 7-by-8 array. Nothing is permanent until Y is entered

Listing 1 continued.

```

Procedure gGet_String; {Prompt:string; Len:integer; var Ans:string}
Var I:integer;
    Entry:string;
    inchar:char;
    clever: record {used to convert char to string}
        case boolean of
            false: (str1:string[1]);
            true: (ch:packed array [0..1] of char)
        end;

Begin
    Entry:='';
    Wstring(Prompt);
    Wchar([''];gFillField(Len,' ');Wchar('');gLeft(Len+1);
    I:=0;
    With clever do begin
        str1:=''; {sets 1st byte of clever to 1}
        Repeat
            I:=I+1;
            Read(inchar);ch[1]:=inchar;
            If (Ord(ch[1])=8) {backspace} and (I>1) then begin
                Delete(Entry,Length(Entry),1);
                I:=I-2;gLeft(1);Wchar(' ');gLeft(1)
            end
            else If (Ord(ch[1])<Ord(' ')) or (EOLN) {<cr>}
                then I:=Len {normal end to Get_String}
                else begin
                    Entry:=concat(Entry,str1); {str1 is ch[1]}
                    Wchar(ch[1])
                end;
        Until I>=Len;
    end; {with}
    UnitClear(1); {clears any extra characters}
    Ans:=Entry
End;

Begin {initialize unit}
End.

```

Listing 2. ChngChar program.

```

{$s+}

Program ChngChar;

Uses
    Turtlegraphics,
    {$U Units:GrafText.code } GrafText;

Const
    ArrayX = 15;
    ArrayY = 18;
    RowMax = 7;

Type
    CharImage = Packed Array [0..7] of 0..255; {1 byte}
    CharSet = Packed Array [0..127] of CharImage; {ASCII Set}

Var
    Characters: CharSet;
    OutFile : File;
    Ch, Ans : Char;
    Row, I, J, Y, Xfr : Integer;
    Instring:string;
    NewChar : Array[0..RowMax] of String[7];

Procedure InitNewChar;
Begin
    For Row:=0 to RowMax do
        NewChar[Row]:=' ' {7 spaces}
    End;

Procedure DspNewChar;
Var Y:Integer;
Begin
    gVtab(9);gCenter('Space = Noplot, x = plot');
    gAt(ArrayX,ArrayY);Wstring(' 1234567');
    Y:=ArrayY;
    For Row:=0 to RowMax do
        Begin
            Y:=Y-1;gAt(ArrayX,Y);
            Wchar(Chr(Row+48)); {row#}
            Wstring(Concat(' ',NewChar[Row], ' '))
        End
    End;

Procedure Stuff;
Var BitValue:1..128;
Begin
    For Row:=0 to RowMax do
        Begin
            BitValue:=1;
            Characters[Ord(Ch),Row]:=0;
            For I:=1 to 7 do
                Begin
                    If (NewChar[Row,I]<>' ') then
                        Characters[Ord(Ch),Row]:=Characters[Ord(Ch),Row] + BitValue;
                    BitValue:=BitValue * 2
                End
            End
        End
    End;

```

Listing 2 continued.

Forbidden Fruit...

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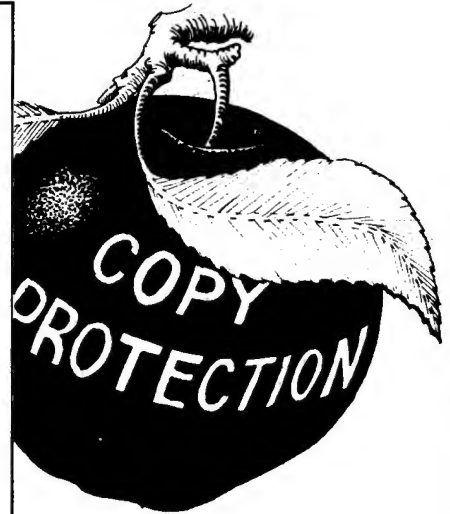
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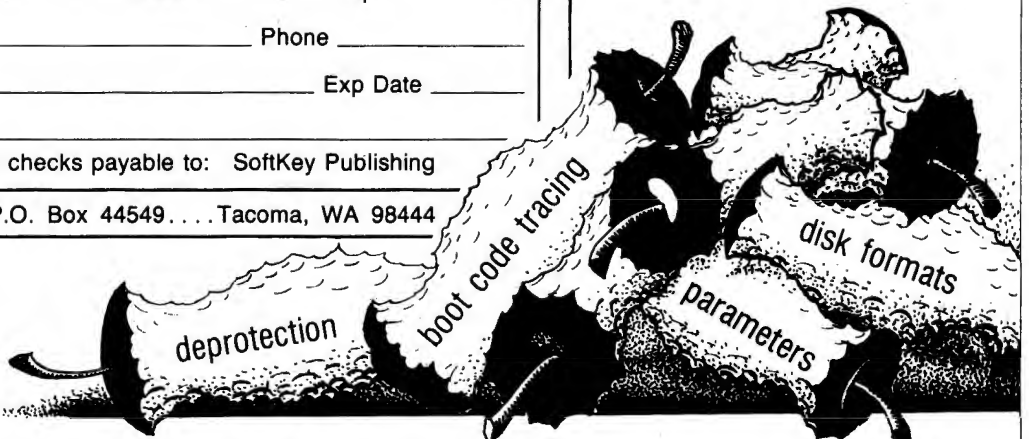
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Listing 2 continued.

```

End;
Xfr:=BlockWrite(OutFile,Characters,2,0)
End;
Begin {main segment}
Reset(OutFile,'Apple1:System.CharSet');
Xfr:=BlockRead(OutFile,Characters,2,0);
Repeat
  Repeat
    gClear;gDown(1);gCenter('Change Character Bit Map');
    gDown(2);gCenter('Characters');
    J:=40;
    For I:=0 to 127 do begin {all ASCII codes}
      If J=40 then begin J:=0;gHtab(0);gDown(1) end;
      Wchar(Chr(I));J:=J+1
    end;
    gAt(2,20);gGet_Char('Character to change: ', Ch, [Chr(0)..Chr(127)]);
    gAt(2,21);gGet_Char('OK (Y/N): ', Ans, ['Y','N']);
  Until (Ans='Y');
  InitNewChar;
  Repeat
    DspNewChar;gAt(0,ArrayY-1);
    For Row:=0 to RowMax do
      Begin
        gHtab(ArrayX+1);NewChar[Row]:='';
        gGet_String(' ', 7, Instring);
        If length(Instring)<7 then
          For I:=1 to (7-length(Instring)) do
            Instring:=concat(Instring,' ');
        NewChar[Row]:=copy(Instring,1,7);
        gUp(1)
      end;
    gAt(2,20);gGet_Char('Save this picture? Y/N/Q: ', Ans, ['Y','N','Q']);
    Until (Ans='Y') Or (Ans='Q');
    If (Ans='Y') then Stuff;
    gAt(2,20);gGet_Char('Another Character? (Y/N): ', Ans, ['Y','N']);
    Until (Ans='N');
  Close (OutFile,Lock)
End.

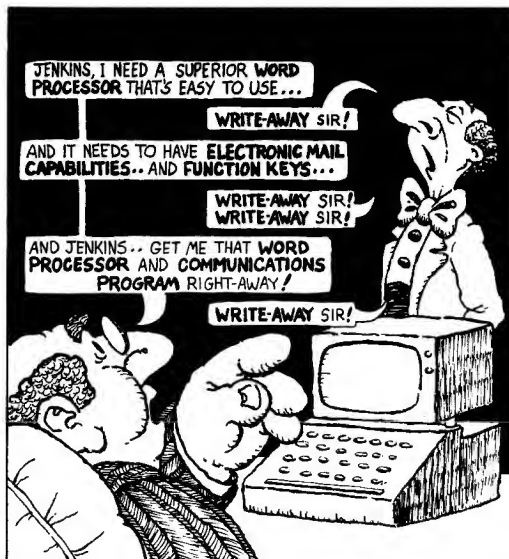
```

to 'Save this picture'.

Most of the character pictures leave the bottom row and the right column of pixels in each character blank to keep the characters from running together. Each character is actually described within a 6-by-7 array. Using the entire 7-by-8 array for larger letters will necessitate modifying the GrafText procedures to skip a column of pixels between characters and a row of pixels between each line. Smaller letters, as used in superscripts and subscripts, can be accomplished easily with these procedures. Larger pictures can be described by defining several characters to represent parts of the whole. Some animation effects can be accomplished by defining different letters to represent different positions or configurations of a portion of the whole picture and then drawing them with WCHAR or WSTRING in succession. ■

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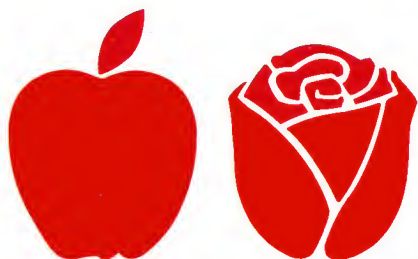


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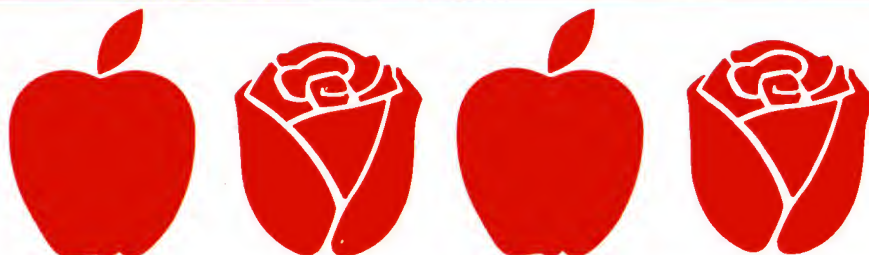


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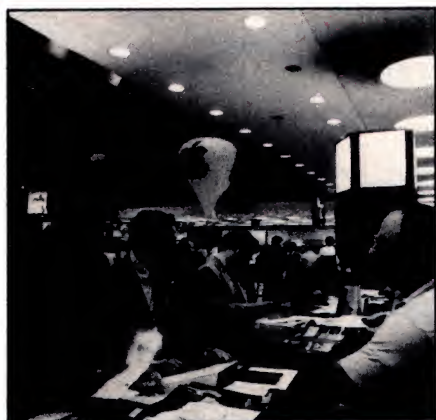


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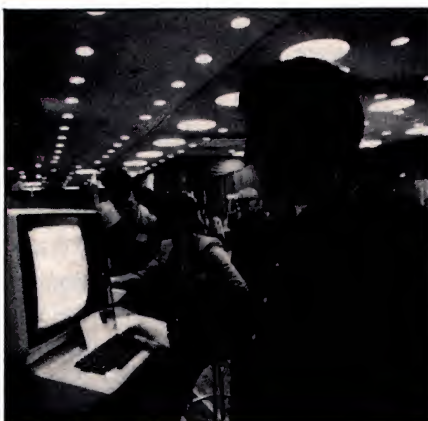
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inCider's inSidious inSolubles

— by Art Ude —

Welcome to *inCider's* inSidious inSolubles—a series of maddening challenges for you shrewd and observant programmers. Each month we list a short Applesoft Basic program that *seems* to run correctly—but there *is* something wrong. Oh, you won't see anything as obvious as SYNTAX ERR, or any other error for that matter. However, that programmer's sixth sense that you have developed slaving over a hot keyboard will tell you something is amiss. The answer appears elsewhere in the issue. Some solutions are very easy, some considerably harder. Some are "cute," some tricky.

The folks at *inCider* encourage readers to submit their own inSidious inSolubles. While there is no length limit, the shorter the better. All submissions should contain the correct solution and conform to all the specifications below. If your program is especially ingenious, you will receive either a free 12-month subscription to *inCider*, or a 12-month extension of your present subscription. Take a whack at it!

Here are the guidelines and suggestions for solving an inSoluble:

1. The Basic programs are in straightforward Applesoft. Any poked machine language subroutines and calls to that subroutine are correct.
2. You should get some kind of a result from the program; in other words, it shouldn't crash.
3. You should not get an error message of any kind. If you do, check your typing.
4. There will be a short explanation of

what the program is supposed to do. Read this explanation *carefully*. It may contain clues to the problem.

The Banner

Run a continuous message along any part of your screen. The VTAB (V) position is set to put it under a graphic picture, but change it to any place you wish. S is the speed at which the message flows across the screen. The higher the number, the slower it goes. There's only one small problem... well, maybe more than one. ■

Solution on page 135.

```

10 GOSUB 200
20 FOR H = 40 TO 1 STEP - 2
30 VTAB V: HTAB H: C = C + 1
40 IF C < L THEN PRINT MID$ (A
   $,1,C)
50 IF C = L OR C > L THEN PRINT
   A$
60 FOR D = 0 TO S: NEXT D: NEXT
   H
70 FOR H = 2 TO K: C = C + 1: VTAB
   V
80 IF C = L OR C < L THEN PRINT
   MID$ (A$,H,C)
90 IF C > L THEN PRINT MID$ (A
   $,H,L)
100 FOR D = 0 TO S: NEXT D: NEXT
   H
110 KEY = PEEK ( - 16384): ON KE
   Y > 128 GOTO 240
120 GOTO 20
200 CALL - 936
210 VTAB S: PRINT "TYPE IN YOUR
   MESSAGE, PLEASE:" INPUT A$
220 S = 80: V = 21
230 A$ = A$ + " ": L = LEN (A$): RETURN
240 END

```

Program listing. The Banner.

Submit your own inCider inSidious inSolubles to Art Ude, c/o inCider, Pine St., Peterborough, NH 03458.



Clearmem

You can easily and quickly clear your Apple's memory to see where programs and data are with this handy set of programs.

by David C. Lowe

Being able to modify your Apple's memory gives real power to the art of tracing or modifying programs. Many programs use different amounts of memory, depending on the parameters you set when you run the program. Understanding what is in the memory of your Apple is critical to answering such problems as: How does one modify a program like FID to be able to recognize different volumes? What do you do if you wish to modify your favorite game so that you can automatically jump to a higher level? To investigate problems such as these, it is helpful to be sure that you are looking at live code and not random numbers or an old Basic program. A serious investigation of the Apple's memory takes a lot of study and work, but as you gain practice, it becomes easier. Clearmem helps you get rational practice.

When one does a cold start (turns the machine on), most of RAM is "garbage." Most of the locations in memory have some value which is determined accidentally. This means that when you load in a machine code program and issue a CALL -151 to look at memory, it is difficult to tell what is code, what is data, and what is garbage. A useful solution is to clear out memory and install your own character in the range where programs live.

You need to be careful not to clear out critical memory areas such as page zero (where the Apple keeps information it needs to run), DOS, the keyboard buffer, etc. A safe area is that between hex \$800 (decimal 2048) and hex \$9600 (decimal 38400). This is where most programs of any appreciable size are located.

One way to put your own character in memory is with a monitor command, which I find cumbersome and error-prone. You can be fooled by looking at memory locations to find the address and length of the most recently loaded program. Clearmem is a sure-fire way to clear out memory. Another way would be to write a short Basic program which would look like this:

```
3 REM Title of this program is MEMORY
  FILLER
5 X = (the value you wish in memory)
10 FOR I = 2048 TO 38400
20 POKE I,X
30 NEXT
```

The first problem with this program is that as listed the program overwrites itself (and thus will not run) unless you set the program pointers at \$67 and \$68 (decimal 103 and 104) on page zero so that the program is loaded in a different range of memory than that which it is writing to. You could write an associate program which pokes the values of 30 and 03 into those locations. The program will then load down at \$330 (decimal 816) and all will be fine. An interesting way to do this is to create a text file which you can run to set things up so that Memory Filler loads at the right place. This can be done with a simple Applesoft program which looks like this:

```
10 PRINT CHR$(4) "OPEN TEXT
  DRIVER"
20 PRINT CHR$(4) "WRITE TEXT
  DRIVER"
100 PRINT "POKE 103,0"
200 PRINT "POKE 104,3"
300 PRINT "RUN MEMORY FILLER"
500 PRINT CHR$(4) "CLOSE TEXT
  DRIVER"
```

When you EXEC TEXT DRIVER it will make the appropriate pokes for you and run the Applesoft program to fill memory with your character.

The second problem with the Basic program listed above is that it takes about four minutes to run. This is just too slow! Even a compiled version of the program takes between 40 and 60 seconds to run (depending on which compiler you use). There must be a faster way! Here it is.

I wrote the following set of programs as an easy and quick way to fill memory, and also as an exercise in the capabilities of the Apple. The three short programs interconnect to fill up memory with a known quantity.

The first of these programs is similar to the one above which sets the pointers at \$67 and \$68 and runs an Applesoft program starting at \$330 (816 decimal). Here is the program that writes the text file:

```
10 PRINT CHR$(4) "OPEN CLEARMEM
  INIT"
20 PRINT CHR$(4) "WRITE CLEARMEM
  INIT"
100 PRINT "POKE 103,0"
200 PRINT "POKE 104,3"
300 PRINT "RUN CLEARMEM DRIVER"
500 PRINT CHR$(4) "CLOSE CLEARMEM
  INIT"
```

If you looked in the text file, it would look like this:

```
POKE 103,0
POKE 104,3
RUN CLEARMEM DRIVER
```

David C. Lowe is Director of the Apple Laboratory at the University of Kentucky. You can write to him at 115 Kastle Hall, Department of Psychology, University of Kentucky, Lexington, KY 40506.

When you type in EXEC CLEARMEM INIT it does not use any area of memory that we are interested in. It makes the pokes and runs the Applesoft program CLEARMEM DRIVER.

CLEARMEM DRIVER (Listing 1) is the Applesoft program which lets you enter the character you want in memory and which interfaces with the machine code program that actually puts the character there. This program permits you to specify which character you wish to place in the Apple's memory. Notice that the number you enter will be converted to hexadecimal in the Apple memory. Thus, if you enter

"This program permits you to specify which character you wish to place in the Apple's memory."

255 in response to the prompt, the memory of the Apple would contain \$FF from locations \$800 to \$9600. If you enter a 10, the Apple's memory would be filled with \$0A. You need to experiment and see what values work best for you. If you clear the memory and load an Applesoft program, it is usually best to put zeros in the memory. This keeps the Apple happy because it can easily tell where the program ends.

The machine code program actually does the work of placing the character in memory. Listing 2 shows the assembled (I used Big Mac) program. The machine code program runs in well under one second, and is short enough that you can enter it in a short time. If you wish, you can dispense with the text file and the Applesoft program above and deal with the machine code program directly, but then it takes a little more work on your part. You can make it run from a Basic environment with a simple CALL 768. Another way is to enter the monitor (CALL -151) and type 300G. Either of these operations will fill the memory range \$800 to \$95FF with whatever is in memory at \$304 (decimal 772). You, of course, can change the contents of \$304 by typing 304:(your value) from the monitor,

```
5 PRINT CHR$(4);"BLOAD CLEARME
M"
10 HOME
20 PRINT "ENTER THE DECIMAL CHAR
ACTER YOU WOULD "
30 PRINT "LIKE IN THE MEMORY RAN
GE $800 - $9600"
32 INPUT A
35 POKE 772,A
40 CALL 768
```

Listing 1. CLEARMEM DRIVER.

or by saying POKE 772, (your value). You must keep in mind that numbers you enter from a Basic environment are interpreted as decimal, while numbers

you enter from the monitor are interpreted as hexadecimal.

Have fun looking at what is *really* going on in your Apple! ■

```
1 * ASSEMBLED LISTING #2
2 *
3 * PROGRAM CLEARMEM
4 *
5 *BY DAVID C. LOWE
6 *
7 *COPYRIGHT 1983
8 *
9 *
10 *
11 *
12 ORG $300
13 LDA #$00
14 TAY
15 *
16 *HERE IS THE CHARACTER THAT WILL GO IN MEMORY
17 *
18 START LDA #$11
19 STA $800,Y
20 INY
21 BNE START MINOR LOOP
22 LDA $307
23 INC $307
24 CMP #$95
25 BNE START MAJOR LOOP
26 *
27 *RESTORE THINGS TO NORMAL
28 *
29 LDA #$08
30 STA $306
31 LDA #$00
32 STA $307
33 RTS
0300: A9 00
0302: A8
0303: A9 11
0305: 99 00 08
0308: C8
0309: D0 F8
030B: AD 07 03
030E: EE 07 03
0311: C9 95
0313: D0 EE
0315: A9 08
0317: 8D 06 03
031A: A9 00
031C: 8D 07 03
031F: 60
```

Listing 2. CLEARMEM machine code program.

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Probing Apple Disk Files

Here is a utility that lets you examine
the hex and ASCII contents of any DOS 3.3 file.

by Antonio C. Silvestri

```
"DOSDUMP RTWS ROUTINE.OBJ0" LOCATED

FILE CHARACTERISTICS ARE:

1. FILE IS AN UNLOCKED FILE
2. FILE IS A BINARY FILE
3. FILE OCCUPIES 2 SECTORS

THE FILE BYTE CONTENTS IS:

0000: 98 3A 1E 00 A9 3A A0 A1  ....:
0008: 20 D9 03 60 00 01 60 01  Y....
0010: 00 11 0F B2 3A B4 3A 00  ...2:6:
0018: 00 01 00 00 60 01 00 01  ....
0020: EF D8 FF  oXB

END OF FILE REACHED
THERE ARE 35 BYTES IN THIS FILE


"RANDOM ACCESS EXAMPLE" LOCATED

FILE CHARACTERISTICS ARE:

1. FILE IS AN UNLOCKED FILE
2. FILE IS A TEXT FILE
3. FILE OCCUPIES 3 SECTORS

THE FILE BYTE CONTENTS IS:

0000: D4 C8 C9 D3 A0 C9 D3 A0  THIS IS
0008: C1 CE A0 C5 D8 C1 CD D0  AN EXAMP
0010: CC C5 A0 CF C6 A0 D7 C8  LE OF WH
0018: C1 D4 A0 C4 CF D3 C4 D5  AT DOSDU
0020: CD D0 A0 D7 C9 CC CC A0  MP WILL
0028: C4 CF 8D 00 00 00 00 00  DO.....

0128: 00 00 00 00 C9 C6 A0 C1  ....IF A
0130: A0 CC C1 D2 C7 C5 A0 CE  LARGE N
0138: D5 CD C2 C5 D2 A0 CF C6  UMBER OF
0140: A0 DA C5 D2 CF D3 A0 C1  ZEROS A
0148: D2 C5 A0 D0 D2 C5 D3 C5  RE PRESE
0150: CE D4 8D  NT.

END OF FILE REACHED
THERE ARE 339 BYTES IN THIS FILE
```

Figure 1. Sample DOSDUMP output.

As a DOS 3.3 user, you probably often run programs that store data to a disk file. Perhaps you have found yourself staring at the glowing LEDs on your drives, hoping the programs do not contain errors. But you won't find out until you try to read the data back and DOS issues input error messages such as EXTRA IGNORED or END OF DATA. And while DOS is nice enough to tell you there is an error, it doesn't tell you where the error is located. You are left to search for logic errors in the programs that store and read the data, a time-consuming and often frustrating process.

Those who use CP/M may be familiar with the DUMP transient command that outputs the contents of a file in hexadecimal form. Many programmers use DUMP to see if data is stored correctly, and this utility proves to be a good debugging tool for programs that involve disk I/O.

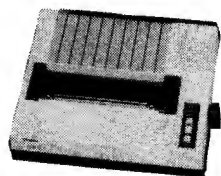
DOS 3.3 does not have a comparable utility. I have filled the void with the utility presented in this article.

Features

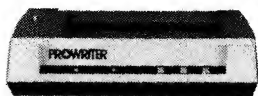
The utility, which I call DOSDUMP, displays all the same data as CP/M's DUMP, and adds other features. DOSDUMP is actually a combination of an Applesoft Basic

Antonio C. Silvestri teaches computer science at Springfield Technical College and presides over a computer consulting firm. You can write him at Systems Consultants Inc., 995 Sumner Ave., Springfield, MA 01118.

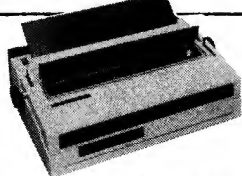
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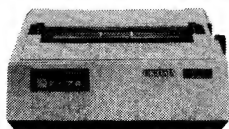
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program and two machine language routines—one that reads a disk sector, another that outputs data to the monitor. Figure 1 shows a typical output from DOSDUMP.

DOSDUMP will display all file types. Consequently, first the general characteristics of the file to be dumped are output. These include the file's type (Applesoft, Integer, binary, or text), its occupied sector count and its write-protect status.

Next comes the imitation of CP/M's DUMP. The four-digit number at the left of each line is the relative address of the first byte on that line, expressed in hexadecimal. The pairs of hexadecimal digits that follow represent the actual bytes read from the file, one pair for each byte. DOSDUMP also outputs the ASCII characters that the pairs of hex-digits represent, to facilitate the interpretation of hex-pairs if they represent text data.

If a large number of consecutive zero bytes occurs, DOSDUMP puts three continuation periods in the middle of the output listing. Normal output resumes when the first non-zero byte is encountered.

Finally, DOSDUMP displays the exact number of bytes contained in the file, a more accurate indication of a file's length than the occupied sector count.

Implementation

To use DOSDUMP, you must have the Basic program and the two machine language routines on disk. You can use either an assembler or the monitor to enter the routines. After BSAVEing the routines, enter the Basic program and save it on the same disk. When you run DOSDUMP, the two routines will load automatically and the program will supply the necessary prompts.

The RWTS Subroutine

The disk communication routine for DOSDUMP is the RWTS subroutine available in DOS 3.3. This machine language subroutine enables the user to read from, or write to, any track and sector on the disk.

To use RWTS you must first create an input/output control block (IOB) table containing information RWTS

SOURCE FILE: DOSDUMP RTWS ROUTINE									
0000:	1	*****							
0000:	2	*							
0000:	3	* READ DISK SECTOR DRIVER ROUTINE							
0000:	4	*							
0000:	5	* BY ANTONIO C. SILVESTRI							
0000:	6	* SYSTEMS CONSULTANTS							
0000:	7	*							
0000:	8	*****							
0000:	9	*							
03D9:	10	RTWS EQU \$03D9						READ OR WRITE	
0000:	11	*						SECTOR ROUTINE	
		----- NEXT OBJECT FILE NAME IS DOSDUMP RTWS ROUTINE.OBJ0							
3A98:	12	ORG \$3A98							
3A98:A9 3A	13	LDA #IBTYP							
3A9A:A0 A1	14	LDY #IBTYP							
3A9C:20 D9 03	15	JSR RTWS							
3A9F:60	16	RTS							
3AA0:EA	17	NOP							
3AA1:	18	*							
3AA1:01	19	IBTYP DFB 1						I/O CONTROL BLOCK	
3AA2:60	20	IBSLOT DFB \$60							
3AA3:01	21	IBDRVN DFB 1							
3AA4:00	22	IBVOL DFB 0							
3AA5:11	23	IBTRK DFB \$11						DIR TRACK NO.	
3AA6:0F	24	IBSECT DFB \$0F						DIR SECTOR NO.	
3AA7:B2	25	IBDCTL DFB >DCTAB						DCT ADDR	
3AA8:3A	26	IBDCTH DFB <DCTAB							
3AA9:B6	27	IBBUFL DFB >BUFAD						DB #1 ADDR	
3AAA:3A	28	IBBUFH DFB <BUFAD							
3AAB:00	29	DFB 0						UNUSED	
3AAC:00	30	DFB 0						UNUSED	
3AAD:01	31	IBCMD DFB 1						READ A SECTOR	
3AAE:00	32	IBSTAT DFB 0						RWTS ERROR CODE	
3AAF:00	33	IBSMOD DFB 0						VOLUME NO.	
3AB0:60	34	IBPSN DFB \$60						PREV SLOT NO.	
3AB1:01	35	IBPDN DFB 1						PREV DRIVE NO.	
3AB2:	36	*							
3AB2:00	37	DCTAB DFB 0						DCT	
3AB3:01	38	PPTC DFB 1							
3AB4:EF	39	MONTCL DFB \$EF							
3AB5:D8	40	MONTCH DFB \$D8							
3AB6:	41	*							
3AB6:	42	BUFAD DS 256						DATA BUFFER #1	
3BB6:	43	DS 256						DATA BUFFER #2	

Listing 1. Source file for the RWTS routine.

needs for performing a specific disk I/O function. The table must be initialized before a call to RWTS is made. The utility reads desired sectors by setting the track and sector parameters in the IOB table. Each disk sector stores 256 bytes that are transferred to a data buffer of equal length whose memory location is also specified as a parameter in the IOB table.

A device characteristics table (DCT) must also be created to tell RWTS the physical specifications of the disk drive. This table contains the standard values for Disk II drives and should not be changed during program execution. Refer to the *DOS Manual* for a detailed description of the RWTS subroutine, the contents of the IOB table, and the values to place in the DCT.

The RWTS interface is loaded at memory location 15000 (\$3A98). The assembly language program appears in Listing 1. As you can see, there aren't many machine language instructions involved. The A and Y registers must contain the address of the starting location of the IOB table. The A register holds the high address byte, and the Y register the low address byte. A JSR (jump to subroutine) instruction diverts to location \$3D9, which in turn JMPs to the actual location of RWTS in DOS. After the input/output, the routine returns (RTS) to the calling program.

After these instructions the IOB table is located at 15009 (\$3AA1). The listing indicates that when the routine is loaded into memory and executed, it reads a sector from disk. This sector

Figure 2.
RWTS memory map.

Decimal Location	Hex Location		Basic Expression	Comment
15000	\$3A98	RWTS Subroutine	BA	Start of RWTS routine
15007	\$3A9F		BA + 7	End of RWTS routine
15009	\$3AA1		BA + 9	Start of IOB
15013	\$3AA5	IOB	NT	Track specifier
15014	\$3AA6		NS	Sector specifier
15017	\$3AA9		BL	Low address byte of data buffer
15018	\$3AAA		BH	High address byte of data buffer
15025	\$3AB1	DCT	BA + 25	End of IOB
15026	\$3AB2		BA + 26	Start of DCT
15029	\$3AB5		BA + 29	End of DCT
15030	\$3AB6	Data Buffer #1	BA + 30	Start of data buffer #1
15285	\$3BB5		BA + 285	End of data buffer #1
15286	\$3BB6	Data Buffer #2	DB	Start of data buffer #2
15541	\$3CB5		BA + 541	End of data buffer #2

is sector 15 of track 17, on drive 1 in slot 6.

The device control table is located immediately after the IOB table, at location 15026 (\$3AB2). Two 256-byte data buffers, allocated in DOSDUMP, reside immediately after the device control table at location 15030 (\$3AB6) for buffer 1 and 15286 (\$3BB6) for buffer 2. Figure 2 displays the memory map for the RWTS interface routine.

File Reading

Now to DOSDUMP's procedure for dumping a file. The filename to be dumped must be found in the disk directory. The first directory sector, track 17 (\$11), sector 15 (\$0F), is loaded into data buffer 1 when the RWTS routine is first called. Figure 3 displays the byte contents of a directory sector.

Each directory sector can store seven filenames as entries, each containing information such as where the file is located on the disk, its type, its sector count and its filename. Figure 4 displays the byte contents of a directory entry.

The seven directory entries are checked for an exact match to the filename. If byte zero for a particular entry is 255 (\$FF), then the filename in that entry is ignored and the next is checked. This is because when DOS deletes a file, it places 255 (\$FF) in the byte to mark the filename as deleted.

If the desired filename is not located, the track/sector location of the next directory sector is loaded into the IOB table for the next RWTS call. This location is found in bytes 1 and 2 of the current directory sector. DOSDUMP reads this sector into data buffer 1. Searching continues until either a matching filename is found or

no directory entries are left.

Determining whether you are at the end of a directory requires checking for two possible conditions: if byte 0 of a directory entry contains a zero, signifying that no filenames have been stored to this point, and if bytes 1 and 2 of the current directory sector contain zeros, indicating that no other sector has been linked to this one.

When a matching filename is found, bytes 0 and 1 of the directory entry contain the track and sector numbers, respectively, for the file's track and sector list. This track/sector list is read into data buffer 1.

Figure 5 (page 106) shows the byte contents of a track/sector list sector. The track/sector list, as the name implies, is a list of the sectors allocated for the file. Each sector has a track/

sector pair for locating it. The track/sector list sector can hold a maximum of 122 sector locations. If a file needs more sectors, bytes 1 and 2 of the track/sector list sector contain the track/sector location for the file's subsequent track/sector list sector; otherwise these bytes are zeroed to indicate the final sector of the track/sector list.

In dumping a non-text file, each non-zero track/sector pair in the list tells DOSDUMP where to find the file's data. A 0/0 pair indicates an unassigned file sector. The first occurrence of such a sector in the list indicates the end of the file. This is logical since outputting binary and Basic program images requires a sequential sector-to-sector allocation. If no sector has been allocated, end-of-file must be assumed.

For non-text files, DOSDUMP reads data sequentially from the assigned file sectors into data buffer 2, outputs this buffer to the screen, and counts the file bytes processed. It assumes that trailing zero bytes in the last assigned data sector are not part of the file and does not include them in the count. Since it is possible to have valid binary code with trailing zeros, the byte count displayed will be smaller than you'd expect.

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	LINK															
16	DIRECTORY ENTRY #1															
32																
48	DIRECTORY ENTRY #2															
64																
80																
96	DIRECTORY ENTRY #3															
112																
128	DIRECTORY ENTRY #4															
144																
160	DIRECTORY ENTRY #5															
176																
192	DIRECTORY ENTRY #6															
208																
224	DIRECTORY ENTRY #7															
240																

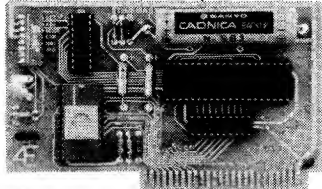
LINK—Track/sector of next directory sector. 0/0 indicates no more exist.

Figure 3. Byte contents of a directory sector.

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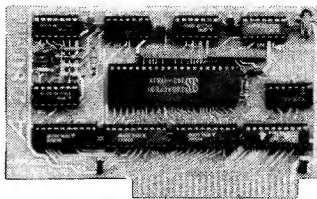
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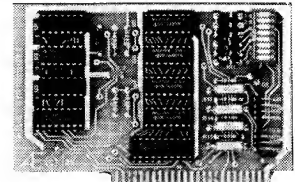
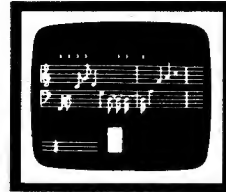
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VISION80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX80	MORE	YES	YES	NO	NO	YES	NO	NO	YES
SMARTERM	MORE	YES	YES	NO	NO	NO	YES	YES	NO
VIDEOTERM	MORE	NO	NO	YES	NO	YES	YES	NO	YES

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	0	1	2	3	4	5	6	7
0	TSP		FT					
8	FILENAME							
16								
24								
32		FL						

TSP—Track/sector location of first track/sector list sector. Byte 0 contains \$FF if file is deleted.

FT—File type. Contains the following:

\$00 for a text file

\$01 for an Integer Basic file

\$02 for an Applesoft Basic file

\$04 for a binary file

The most significant bit is set if the file is locked.

FL—File length, in sectors.

Figure 4. Byte contents of a directory entry.

Text files are handled differently. Because they can be generated using random access record structures, it is

possible for gaps to exist in the file where space is reserved for records that have not yet been written in. If

the record length is long enough and there is a substantial difference between record numbers, unassigned sectors can be found between assigned sectors in the track/sector list.

In processing text files, DOSDUMP adds 256 to the byte count each time an unassigned sector is located between assigned sectors. End-of-file is determined by scanning the entire track/sector list for possible assigned sectors and checking for zeros in bytes 1 and 2 of the list. Like non-text files, trailing zeros in the last assigned sector, as well as zeros attributed to the final unassigned sectors, are not counted in the byte count of the file.

The Basic Listing

DOSDUMP's Basic program appears in Listing 2. Lines 10 and 20 clear the screen and variables. The HIMEM instruction prevents Basic from using memory above location 15000. As discussed earlier, the RWTS routine, tables and buffers reside above this location. Variables that address specific IOB table and data buffer locations (Figure 2) are initialized. The RWTS interface then is loaded into memory. Program execution continues to line 190, prompting and searching for a filename to dump.

Lines 190 and 200 check for the existence of the machine language output routine. If the two bytes at locations 794 and 795 are 225 and 172, respectively, it is assumed the entire routine is resident in memory and the three bytes at locations 781-783 are initialized to zero. These bytes contain the byte count for the file and an internal counter used specifically by the output routine. If the routine is not resident, it is loaded from disk and run. The immediate execution of this routine sets up pointers in page zero needed for further execution. I'll discuss this in more detail later along with the output routine.

Lines 210-230 initialize string arrays with file type descriptors. The appropriate descriptor is issued when a filename is found in the directory. Prompting for a filename is performed. For user convenience, pressing the return key alone makes a catalog of the disk appear on the

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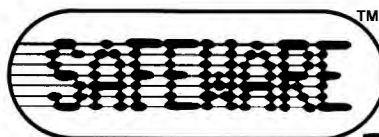
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Listing 2.
DOSDUMP.

screen. This feature comes in handy if you don't remember the exact spelling of a filename. Entering a filename continues execution to line 240.

Lines 240-310 search the directory for the filename stored in TY\$. An immediate call to the RWTS routine is made to read the first directory sector. The FOR...NEXT loop with index variable letter I scans the seven directory entries, then the IF statement in line 240 checks the value of the first byte of each entry. A value of zero indicates the end of the directory, and the program terminates with the appropriate message on line 320.

If the value of the first byte is 255, indicating a deleted file, then the IF statement in line 250 ignores the entry, and execution continues to line 310 where the next filename is checked.

Lines 260-280 compare the string stored in TY\$ with the filename in the current directory entry. If they match, execution continues with the statements after the NEXT in line 280. At the first discrepancy between the two strings, execution continues to line 310, checking the next filename.

When finding the filename, lines 280-300 output the file's attributes. The location of the file's track/sector list is loaded into the RWTS interface's IOB table with the pokes in line 300. Execution continues to line 30 where the actual byte dumping is performed.

If the filename does not match any of the seven entries in the current directory sector, the next existing directory sector is searched. This is done by poking the location of the next directory sector into the RWTS routine's IOB table, as shown in line 310. The search repeats through line 240.

Lines 30-180 dump a file's contents. An immediate call to the RWTS routine places the file's first track/sector list sector in data buffer 1. The address of data buffer 2 is poked into the IOB table so that further RWTS calls will load this buffer and not overwrite buffer 1.

The FOR...NEXT loop indexed with variable I in line 30 scans the file's track/sector list of sector locations. If the sector location indexed by I is assigned, the IF statement in line 30

```

1      REM                                DOSDUMP
2      REM
3      REM                                A PROGRAM TO
4      REM                                DISPLAY THE BYTE CONTENTS OF A FILE
5      REM
6      REM                                ANTONIO C. SILVESTRI
7      REM                                SYSTEMS CONSULTANTS

10     CLEAR: TEXT: HOME: BA=15000: HIMEM: BA: DB=BA+286:
      BB=BA+42: BE=BA+43: BT=BA+41:
      DEF FN BG(X)=PEEK(783)*256+PEEK(782)

20     BL=BA+17: BH=BA+18: NT=BA+13: NS=BA+14: D=CHR$(4):
      PRINT D;"BLOAD DOSDUMP RTWS ROUTINE.OBJ0": GOTO 190

30     CALL BA: POKE BH,INT(DB/256): POKE BL,DB-256*PEEK(BH):
      FOR I=0 TO 242 STEP 2: IF PEEK(BB+I)+PEEK(BE+I)<>0 THEN 60

40     IF FT=0 THEN ZC=ZC+256: FL=1: GOTO 160

50     GOTO 170

60     POKE NT,PEEK(BB+1): POKE NS,PEEK(BE+1): CALL BA:
      FOR J=0 TO 255: H=PEEK(DB+J): IF FL=1 THEN 90

70     IF H=0 THEN FL=1: ZC=ZC+1: GOTO 150

80     X=USR(H): GOTO 150

90     IF H=0 THEN ZC=ZC+1: GOTO 150

100    IF ZC>16-PEEK(781) THEN Z1=8-PEEK(781): GOTO 120

110    FOR IX=1 TO ZC: X=USR(0): NEXT: GOTO 140

120    FOR IX=1 TO Z1: X=USR(0): NEXT: ZC=ZC-Z1: FOR IX=1 TO 3:
      PRINT SPC(18);"."; NEXT: BC=FN BG(0)+8*INT(ZC/8):
      ZC=ZC-8*INT(ZC/8): POKE 783,INT(BC/256):
      POKE 782,BC-256*PEEK(783)

130    IF ZC>0 THEN FOR IX=1 TO ZC: X=USR(0): NEXT

```

Listing continued.

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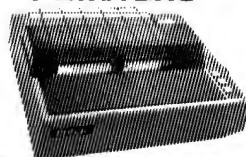
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Listing continued.

```

140 X=USR(H): ZC=0: FL=0
150 NEXT
160 NEXT: IF PEEK(BA+31)+PEEK(BA+32)<>0 THEN
POKE BH,INT((BA+30)/256): POKE BL,BA+30-256*PEEK(BH):
POKE NT,PEEK(BA+31): POKE NS,PEEK(BA+32): GOTO 30
170 IF PEEK(781)<>0 THEN CALL 812
180 PRINT: PRINT "END OF FILE REACHED": PRINT "THERE ARE ";
FN BC(X);" BYTES IN THIS FILE": END
190 IF PEEK(794)<>225 OR PEEK(795)<>172 THEN
PRINT D$,"BRUN DOSDUMP OUTPUT ROUTINE.OBJ0": GOTO 210
200 FOR I=781 TO 783: POKE I,0: NEXT
210 DIM FI$(3), LO$(1): DATA "AN UN", "A ", "A TEXT",
"AN INTEGER", "AN APPLESOFT", "A BINARY": FOR I=0 TO 1:
READ LO$(I): NEXT: FOR I=0 TO 3: READ FI$(I): NEXT:
VTAB 9: HTAB 11: PRINT "INSERT DISK IN DRIVE"
220 HTAB 14: FLASH: PRINT "ENTER": NORMAL: PRINT "FILENAME":
HTAB 4: PRINT "HIT <RET> FOR A CATALOG OF THE DISK":
PRINT: INPUT "-----":TY$: HOME
230 IF TY$="" THEN PRINT D$,"CATALOG": PRINT: GOTO 220
240 CALL BA: FOR I=0 TO 6: IF PEEK(BT+I*35)=0 THEN 320
250 IF PEEK(BT+I*35)=255 THEN 310
260 FOR J=1 TO LEN(TY$): H=PEEK(BT+2+I*35+J): H=H-128*(H/127):
IF MID$(TY$,J,1)<>CHR$(H) THEN 310
270 NEXT: FOR J=LEN(TY$)+1 TO 30: IF PEEK(BT+2+I*35+J)<> 160
THEN 310
280 NEXT: PRINT: PRINT: PRINT CHR$(34);TY$;CHR$(34);
" LOCATED": PRINT: PRINT "FILE CHARACTERISTICS ARE:":
PRINT: H=PEEK(BE+I*35)
290 PRINT "1. FILE IS ";LO$(INT(H/128));"LOCKED FILE":
PRINT: H=H-8*INT(H/8): FT=H-INT(H/4): PRINT "2. FILE IS ";
FI$(FT);" FILE": PRINT: H=PEEK(BA+74+I*35)
300 PRINT "3. FILE OCCUPIES ";H;" SECTORS": PRINT:
PRINT "THE FILE BYTE CONTENTS IS:": PRINT:
POKE NT,PEEK(BT+I*35): POKE NS,PEEK(BB+I*35): GOTO 30
310 NEXT I: IF PEEK(BA+31)+PEEK(BA+32)<>0 THEN
POKE NT,PEEK(BA+31): POKE NS,PEEK(BA+32): GOTO 240
320 PRINT: PRINT "***": FLASH: PRINT "WARNING": NORMAL:
PRINT "***: PRINT CHR$(7);"FILE ";CHR$(34);TY$;CHR$(34);
" DOES NOT EXIST";CHR$(7): END

```

Listing 3. Source file for the output routine.

```

SOURCE FILE: DOSDUMP OUTPUT ROUTINE
0000: 1 *****
0000: 2 *
0000: 3 *          DOSDUMP OUTPUT ROUTINE
0000: 4 *
0000: 5 *          BY ANTONIO C. SILVESTRI
0000: 6 *          SYSTEMS CONSULTANTS
0000: 7 *
0000: 8 *****
FD0A: 9 PRBYTE EQU $FD0A ;PRINT A HEX BYTE
FD0B: 10 COUT EQU $FD0B ;OUTPUT A CHARACTER
FD0C: 11 CROUT EQU $FD0C ;PRINT NEW-LINE
E10C: 12 FPINT EQU $E10C ;REAL-TO-INTEGER CONVERT
0000: 13 *
----- NEXT OBJECT FILE NAME IS DOSDUMP OUTPUT ROUTINE.OBJ0
0300: 14 ORG $0300
0300:A9 4C 15 LDA #$4C ;SET UP THE JUMP STATEMENT

```

Listing continued.

jumps to line 60 for processing.

Two important variables must be mentioned at this point. FL is a flag. If it is 0, no zeros were found prior to the current byte. If it is 1, zeros have been encountered. ZC, the zero byte counter, stores the number of consecutive zeros found.

If the indexed sector location is unassigned, the action taken depends on the type of file being processed. Variable FT contains this information. If the file is a text file, 256 is added to the zero byte counter, ZC. Flag FL is also set to 1. Then execution continues to line 160 where the next file sector is processed. If the file is a non-text type, end-of-file is reached and execution continues to line 170, where the output routine displays the bytes not already displayed. The file's byte count appears and execution terminates on line 180.

If the indexed sector location is assigned to the file, that data sector is read into data buffer 2 as line 60 shows. The FOR...NEXT loop whose index variable is J scans each of the buffer's 256 bytes. The byte indexed by J is stored in variable H. Handling of this byte depends on the value of H and on the state of the flag, FL.

If FL and H are both zero, line 70 executes. FL is set to 1 and the zero counter, ZC, increments. The next byte is checked, with execution continuing at line 150.

If FL is 0 and H is non-zero, line 80 executes. The byte stored in H is passed to the output routine by the USR function. When Basic executes USR, the contents of H go into the floating point accumulator (locations 157-163, or \$9D-\$A3) and a JSR to location 10 is performed. Locations 10-12 contain a JMP instruction to the beginning of the byte output routine. The setting of these locations will be discussed in the output routine section. Execution continues to line 150.

If flag FL is 1 and H is 0, line 90 executes. Only the zero counter increments and the program continues to line 150.

When FL is 1 and H is non-zero the utility outputs the past consecutive zero bytes. Lines 100-140 execute. If more consecutive zero bytes have been encountered than can be dis-

Listing continued.

```

0302:85 0A      16      STA $0A      ;NEEDED FOR THE USR
0304:A9 18      17      LDA #)DISPLY ;FUNCTION
0306:85 0B      18      STA $0B
0308:A9 03      19      LDA #<DISPLY
030A:85 0C      20      STA $0C
030C:60         21      RTS
030D:         22      *
030D:00         23      BUFCNT DFB 0      ;ITEMS COUNT IN BUFFER
030E:00 00      24      BYTCNT DW 0      ;HOLDS TOTAL BYTE
0310:         25      *          COUNT PROCESSED
0310:         26      BUFFER DS 8      ;BUFFER IS 8 BYTES LONG
0318:         27      *
0318:20 0C E1    28      DISPLY JSR FPINT    ;INTEGER FOUND IN $A0-$A1
031B:AC 0D 03    29      LDY BUFCNT    ;LOAD BUFFER WITH DATA
031E:A5 A1       30      LDA $A1      ;WHEN FULL OUTPUT BUFFER
0320:99 10 03    31      STA BUFFER,Y
0323:C8         32      INY
0324:8C 0D 03    33      STY BUFCNT
0327:C0 08       34      CPY #8
0329:F0 01       35      BEQ CONT
032B:60         36      RTS
032C:         37      *
032C:AD 0F 03    38      CONT LDA BYTCNT+1 ;OUTPUT BYTE COUNT OF
032F:20 DA FD     39      JSR PRBYTE ;FIRST BYTE IN LINE
0332:AD 0E 03    40      LDA BYTCNT
0335:20 DA FD     41      JSR PRBYTE
0338:         42      *
0338:A9 BA       43      LDA #$BA      ;OUTPUT A COLON
033A:20 ED FD     44      JSR COUT
033D:         45      *
033D:A9 A0       46      LDA #$A0      ;OUTPUT A SPACE
033F:20 ED FD     47      JSR COUT
0342:         48      *
0342:A0 00       50      LDY #0      ;OUTPUT THE BUFFER
0344:B9 10 03     51      LOOP LDA BUFFER,Y
0347:48         52      PHA
0348:29 7F       53      AND #$7F
034A:99 10 03     54      STA BUFFER,Y
034D:68         55      PLA
034E:20 DA FD     56      JSR PRBYTE
0351:A9 A0       57      LDA #$A0
0353:20 ED FD     58      JSR COUT
0356:C8         59      INY
0357:CC 0D 03     60      CPY BUFCNT
035A:90 E8       61      BCC LOOP
035C:         62      *
035C:AD 0D 03     63      LDA BUFCNT    ;OUTPUT SPACES TO JUSTIFY
035F:0A         64      ASL A      ;TEXT DISPLAY
0360:6D 0D 03     65      ADC BUFCNT
0363:69 07       66      ADC #7
0365:A8         67      TAY
0366:A9 A0       68      LOOP3 LDA #$A0
0368:20 ED FD     69      JSR COUT
036B:C8         70      INY
036C:C0 20       71      CPY #32
036E:90 F6       72      BCC LOOP3
0370:         73      *
0370:A0 00       74      LDY #0      ;OUTPUT THE TEXT EQUIVALENT
0372:B9 10 03     75      LOOP2 LDA BUFFER,Y ;OF THE OUTPUT BYTES
0375:C9 20       76      CMP #$20
0377:90 08       77      BCC CNTL    ;OUTPUT A PERIOD IF
0379:09 80       78      ORA #$80    ;BYTE IS A CNTL CHAR
037B:20 ED FD     79      JSR COUT
037E:18         80      CLC
037F:90 05       81      BCC CHECK
0381:A9 AE       82      CNTL LDA #$AE
0383:20 ED FD     83      JSR COUT
0386:C8         84      CHECK INY
0387:CC 0D 03     85      CPY BUFCNT
038A:90 E6       86      BCC LOOP2
038C:20 8E FD     87      JSR CROUT
038F:         88      *
038F:18         89      CLC          ;UPDATE TOTAL BYTE COUNT
0390:AD 0E 03     90      LDA BYTCNT ;ALSO ZERO BUFCNT FOR
0393:6D 0D 03     91      ADC BUFCNT ;NEXT LINE
0396:8D 0E 03     92      STA BYTCNT
0399:AD 0F 03     93      LDA BYTCNT+1
039C:69 00       94      ADC #0
039E:8D 0F 03     95      STA BYTCNT+1
03A1:A9 00       96      LDA #0
03A3:8D 0D 03     97      STA BUFCNT
03A6:60         98      RTS

```

played in two full output lines, statements 120 and 130 are executed. As mentioned before, three periods appear in the middle of the display to indicate the excessive zero count. If there are relatively few consecutive zero bytes, line 110 passes that many zeros to the output routine. In either case, execution passes to line 140 where the H is sent to the output routine and FL and ZC are zeroed.

This complicated processing of bytes continues until end-of-file is reached. The statements following the NEXT in line 160 determine end-of-file for text files. If no other track/sector list sector exists, program termination occurs after lines 170 and 180. If there is another track/sector list sector, its location is poked into the IOB table, as well as the address of data buffer 1. The process continues with a jump to line 30.

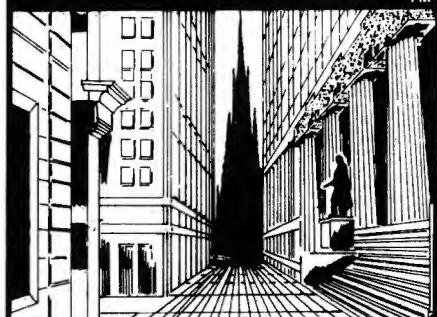
The Output Routine

In its preliminary development stages, the DOSDUMP output routine was written in Basic, but the output proved to be very slow. So I created the machine language version in Listing 3.

Remember I mentioned that the Basic program checks for the existence of the machine language routine? This routine resides at location 768 (\$300). If it is not found, it's loaded from disk and immediately executed. Lines 15-21 are the only instructions that execute. With the actual start of the output routine occurring at location 792 (\$318), these instructions fill locations 10-12 with a JMP statement to location 792 needed by the USR function.

Locations 781-791 (\$30D-\$317) hold data used by the output routine. Locations 784-791 serve as an 8-byte buffer for storing the bytes sent from the Basic program. Locations 782 and 783 hold the total byte count for the file. Location 781 contains the number of bytes currently stored in the buffer.

When the USR function calls this routine, the byte passed to the output routine is stored in the floating point accumulator. This byte is represented as a 5-byte real number that must be converted to an integer by line 28.

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This routine is found in the Applesoft ROM and takes a real number in the floating point accumulator as input and outputs the integer equivalent to locations \$A0 and \$A1. The least significant byte of this integer (in \$A1) is the significant one for the output routine.

Lines 29-36 store this byte in the buffer and increment the buffer byte counter. If there are fewer than 8 bytes in the buffer, the routine returns to the Basic program. If the buffer does contain 8 bytes, it is full and the routine executes the remaining code to output the buffer.

Lines 38-47 output the byte count found in locations \$30E and \$30F. This count serves as the relative file byte address of the first byte in the buffer. A colon and a space are then

output.

Lines 50-61 are a loop that outputs the bytes in the buffer using a monitor ROM routine. The subroutine at \$FDDA converts a byte to its hexadecimal ASCII pair, which is also output by the subroutine.

Lines 63-72 determine the number of spaces needed to align the text display columns. This is particularly important for the very last line, which might not contain 8 bytes.

Lines 74-87 output the text equivalent of the buffer. If the buffer contains unprintable control characters, periods appear in their place.

Lines 89-98 add the contents of the buffer counter to the total byte counter. The buffer counter goes to zero and execution returns to the Basic program. ■

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0	xx	LINK		xx	xx	OFF		xx	xx	xx	xx	xx	S0		S1	
16	S2		S3		S4		S5		S6		S7		S8		S9	
32	S10		S11		S12		S13		S14		S15		S16		S17	
48	S18		S19		S20		S21		S22		S23		S24		S25	
64	S26		S27		S28		S29		S30		S31		S32		S33	
80	S34		S35		S36		S37		S38		S39		S40		S41	
96	S42		S43		S44		S45		S46		S47		S48		S49	
112	S50		S51		S52		S53		S54		S55		S56		S57	
128	S58		S59		S60		S61		S62		S63		S64		S65	
144	S66		S67		S68		S69		S70		S71		S72		S73	
160	S74		S75		S76		S77		S78		S79		S80		S81	
176	S82		S83		S84		S85		S86		S87		S88		S89	
192	S90		S91		S92		S93		S94		S95		S96		S97	
208	S98		S99		S100		S101		S102		S103		S104		S105	
224	S106		S107		S108		S109		S110		S111		S112		S113	
240	S114		S115		S116		S117		S118		S119		S120		S121	

LINK—Track/sector of next track/sector list sector. Contains 0/0 if no other track/sector list sectors exist.

OFF—Sector offset into file of first data sector listed.

S0, S1, etc.—Track/Sector of data sector. If 0/0 is stored in any of these locations, no sector was assigned to that location.

Figure 5. Byte contents of a track/sector list sector.

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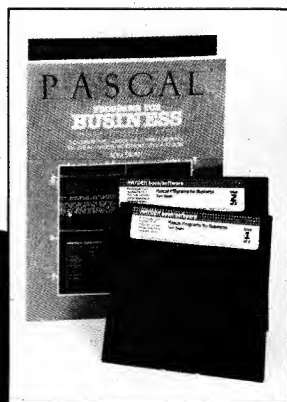
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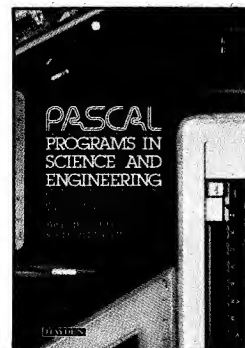
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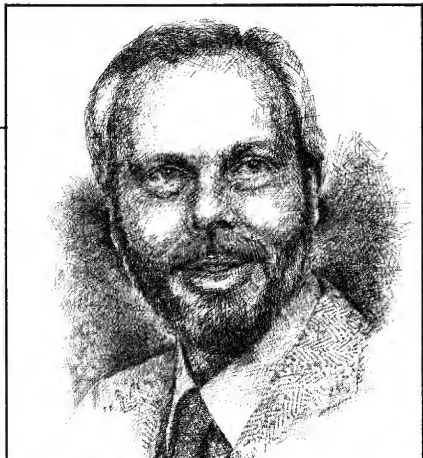
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The Apple Clinic

by Earle Hancock

- Eight-Ton DOS Mover
- Housebreaking the III
- Sporadic Garbage

In the January Apple Clinic I reviewed two Apple II diagnostic packages. One of them, "The Brain Surgeon," has been in my "kit bag" for years and I use it frequently. Oldies may be goodies, but sometimes oldies get updated to be better goodies. "Brain Surgeon" is now called "Master Diagnostics." The update comes in two versions. One, for the Apple II and II Plus, includes several enhancements and a disk read/write head cleaning kit, plus excellent documentation. The other version, for the Apple IIe (no disk read/write head cleaning kit in this version), is equally well presented. Master Diagnostics is a worthwhile update.

I'm looking for Apple diagnostic information to use with my classes and I've been considering the XPS package. Their ad (see page 86 of the January 1984 *inCider*) states that it tests the language card and the "disk system." In the January Apple Clinic, you state that it doesn't check either one (or does "disk system" exclude the disk controller card?). I also notice that they have a package for the Apple IIe. I would appreciate your comments.

D.H. Grout
Randolph, VT

You are quite correct in assuming that the disk system test in the XPS package excludes a test of the ROMs on the disk controller card. The XPS-Diagnostic package does include memory card tests. This was incorrectly reported in the January column. The product previously called Apple-Cillin II is now named XPS-Diagnostic II or IIe.

I own an Apple II Plus, and I have always had trouble cycling the power. If I turn the power off and on again within five to thirty seconds, the Apple will sometimes fail to come on. It just sits there dead. On these occasions, I go away for five minutes and then the computer will turn on fine. Is this common?

I have a Franklin 1200 at home so I can run CP/M on its Z80 card, and I understand that the 64K memory on the card can be used as bank-switched memory from Apple DOS. How can I use this facility?

My Franklin contains 64K of memory for the 6502, but DOS loads into memory where it does in my 48K Apple. Booting master disks or slave disks makes no difference, and I think I need a "DOS mover." I think of a DOS mover as being an eight-ton orange tractor with a fork lift on the front, but I'm sure it is a piece of software. What do I need to use all 64K of my machine? Will Diversi DOS, David DOS, or Pronto DOS contain the facility I need?

M. Seeds
Lancaster, PA

The Apple II power supply should be able to recycle or turn on again within a few seconds after being turned off. Your Apple dealer can replace this power supply (on an exchange basis) for less than \$100. Power supply problems are more common than some other types of computer trouble, but the problem you describe is fairly rare. I don't envision your doing any harm to the computer by not fixing the power supply.

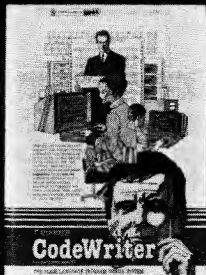
Using the 64K of memory on the Z80 card as extra bank-switched mem-

ory for DOS is possible but complicated. You must contact a Franklin dealer and order a technical package containing a manual and some disk-based utilities. You must then write an assembly-language program to use the memory on the Z80 card. The technical support people at Franklin Computer Company suggest that this is a difficult task not to be taken lightly. I can see many Franklin 1200 users wanting such a program, so if assembly language is your bag you may find a market for this memory management program.

You don't need a fork lift, eight-ton or otherwise, to move DOS into the upper 16K of memory. Normally, Apple DOS resides at \$9D00 (40192 decimal) to \$BFFF (49151 decimal). The 64K of RAM leaves the top 16K of memory unused. If DOS can be moved up to \$DD00 (56576 decimal) to \$FFFF (65535 decimal), then more space in memory is available for Basic programs. All of the enhanced disk-operating systems you mentioned contain the routines (software) to move DOS.

I have an Apple III with the Pro-File hard disk. I can't have a television on in the house when the computer is on. You are supposed to be able to convert the Apple III for residential use, but now that I have one,

Earle Hancock has directed the microcomputer project at Minuteman Regional Vocational School, Lexington, MA, for three years. He has served as an advisor to the Massachusetts Association of Vocational Administrators, and is an active member of the Boston Computer Society and other computer organizations. Address correspondence to him c/o inCider, Pine St., Peterborough, NH 03458.



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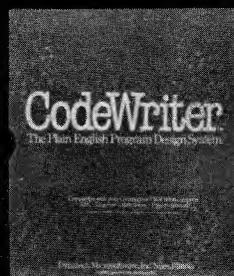
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no one can seem to find out how. I have even called the factory and can't get any answers.

L.K. Quinnan
Sterling, IL

Newer radios and televisions are better designed to resist interference (called TVI). Older models, however, are much more susceptible to interference from electrical appliances, ham and CB transmitters, and computers.

The part of the computer system most responsible for generating TVI is the cable leading to an external disk storage device. Passing data signals back and forth between computer and disk drives is very noisy, electrically speaking. The cable to your ProFile hard disk drive is where I would start eliminating or reducing TVI by switching to a shield cable or

"Eliminating TVI can be a frustrating endeavor, with the final solution resulting from several smaller steps."

by wrapping tin foil around the cable. Be sure to ground the shield or tin foil properly. Adding an AC line filter to your television may help. Although most computer-generated TVI is airborne, some may be passed over the electrical wiring in the house. You may wish to filter the computer's AC line as well.

The offending TVI signals are

probably entering the television through the antenna. Try disconnecting the antenna; if the TVI disappears, then the antenna is the receiving source. Install a high-pass filter on the antenna to help eliminate the problem.

Try moving the television or the computer to a new location in the house or, if possible, install an outside antenna. Eliminating TVI can be a frustrating endeavor, with the final solution resulting from several smaller steps. Even then some TVI may linger. You can buy the shielding and filters at electronics hobby stores like Radio Shack or Heath Electronics.

The Apple III is rated by the FCC as suitable for use in a business environment. As this is being written (late December), Apple Computer has released an upgraded Apple III called the Apple III Plus. In addition

Circle 49 on Reader Service card.

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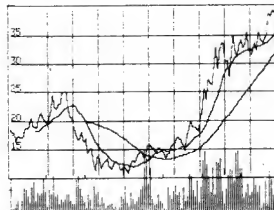
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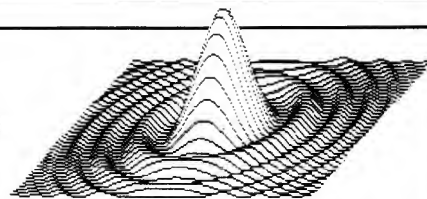
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to some other changes, the III Plus has refinements to the power supply and peripheral card installation, and additional shielding which has caused the FCC to rate it for home use. It radiates far fewer TVI signals and may be the answer to your problem. At this time I know of no conversion for older Apple IIIs to upgrade to the III Plus. Whatever you do, don't give up. Your computer and television can be trained to cohabit with minimal trouble.

My Apple drive has started to write sporadic garbage, causing read-errors on the next pass through the affected sector. I seem to spend more time reconstructing my diskettes with Dark or Fixcat than I do in basic work on the computer. I have

tried the rudimentary fixes—reseating the ICs and connectors—but to no avail.

I adjusted speed using Locksmith, easily centering it on the display. I did note that, three times over the entire Locksmith sequence, a reading appeared that was clearly outside the $\pm 2.5\%$ limits. Is this normal or can this be a clue to my problem?

I tried the track 0 alignment adjustment you described. Time will tell if this cures the problem.

Can you recommend books and manuals that can guide a reasonably adept person through maintenance?

O.W. Acheson
Morristown, NJ

Finding the cause of intermittent problems is difficult. You must identify as many stable factors as possible

to recognize the bug when it appears. To assist you in the search for occasional read/write errors, you need a program that tests for read/write errors continually. Nicrom and XPS, as well as The Filer from Central Point Software, have reliable disk read/write tests. Frequent running of one of these tests should begin to expose a pattern of failure. Once you have determined how often or where on the disk the errors occur, you will have established a reference point to refer to during the repair process.

Armed with this information, your disk drive and your read/write test program, approach your dealer and ask if you may recreate the errors in the store. Your object here is to let the repair person see the error and then to enlist his/her cooperation in the repair process. Make the repair person your ally.

From your description of the problem I cannot determine the cause of the read/write errors. Following the steps outlined above should bring you and the service person to the point where the failure can be traced to the disk drive analog card, the disk mechanical sub-assembly, the disk interface card or the large grey disk drive connecting cable. Each of these can be replaced separately, or the repair person may be able to fix the offending part. Unless you are willing to pay someone else to do it, you are the key person in establishing the evidence needed to make an effective repair when the problem is intermittent.

Books and manuals on computer repair are hard to find. One by Rodney Zaks, called *Don't—Or How to Care for Your Computer*, is very informative and occasionally quite funny, but it does not offer repair procedures for specific computers. It is a general overview on preventive maintenance.

The Mail Bag

This column depends, for its energy and interesting problems, on you. If you have questions about maintenance and repair of your Apple, send them to The Apple Clinic, *inCider* Magazine, Pine Street, Peterborough, NH 03458. ■

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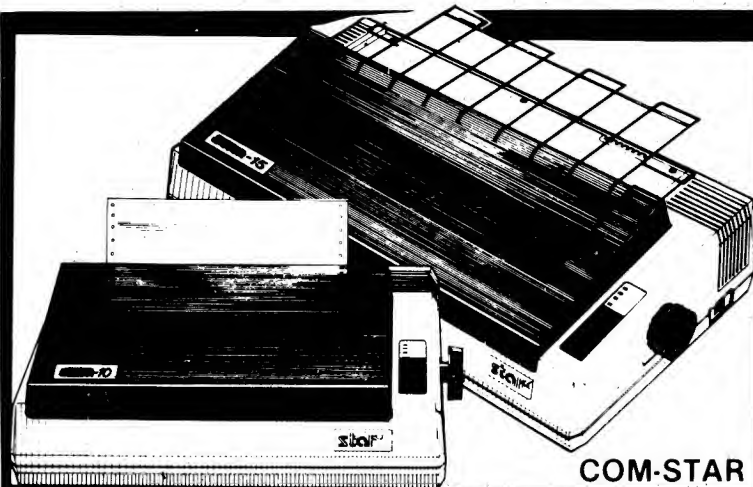
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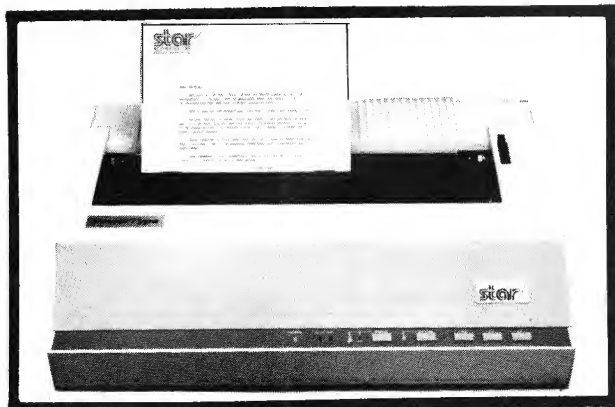
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Bent on Business

by Gregory R. Glau

Taxing Times

Do you find at this time of the year that your cash starts to come in a little slower than usual? That the volume of mail you receive is worse than the usual spasmodic production the post office delivers to your door? Does it sometimes seem that someone—or, as the famous horror-story writer Stephen King might say, *something*—stops your checks from being delivered? That the payments you *do* receive are smaller than what you're accustomed to? That your cash flow simply dries up and doesn't *flow*?

If your business is like ours, it suffers through periods like these, where we receive few payments from our customers, and even those who do send cash pay only part of what they owe us. Anyone who allows their customers to charge their purchases will have this sort of periodic problem with their accounts receivable.

This time of the year, our Uncle in Washington, D.C. slows down *our* collections because of *his* collections. Other periods that affect our heating and cooling business include the opening of school (who buys a new furnace when the children need school gear?) and the Christmas holiday season (who buys a cooler as a present?).

Your business may be much the same, perhaps with different periods when your cash flow seems to evaporate. You can correct part of this problem, however, once you have a knowledge of how your dollars flow through the framework of your accounts receivable system. Anyone with accounts receivable amounts owed him automatically gets a bit of extra baggage with the receivable process. While one class of customer always pays, another class never does. In between those two extremes are the people who you figure will

pay, but you don't know when. Unfortunately, the customer whose account ends up as a candidate for the collection services moves through this middle ground, and you often don't have any accurate way to determine who's going to pay eventually, and who you'll have to turn over for collection.

One helpful thing you can do is to track the movement of your accounts receivable amounts. One of the best ways to do this is with a study of the *average collection period* your business has. In essence, this describes the period it takes you to convert your in-stock inventory into cash, and includes the time it takes you to get the material, deliver and install it, send the bill, and collect for the job. This is a two-stage process, and one with which your spreadsheet program can help.

The first step is to compute your daily credit sales. The most accurate and helpful way to do this is on a monthly basis. To calculate it, you divide your net credit sales for the month by the number of days during the month. It's important to note that you want to work with only *credit sales*, those sales you charge to your customers through your accounts receivable system. These are in contrast to *cash sales*, where you collect for the purchase at the same time you sell it.

For example, you might have sales of \$30,000 that you charged to your customers during one monthly period. If there were 30 days in this particular month, when you divide 30,000 by 30, you find your average credit sales per day were \$1,000.

Your accounting system will also give you your starting period and ending period accounts receivable figures. Total them and divide by two to arrive at an average. For ex-



ample, if at the end of last month your accounts receivable came to \$40,000, and at the end of the current month they total \$55,000, you'd add these two figures together (\$95,000) and divide by 2, for an average accounts receivable balance of \$47,500.

You then divide this (\$47,500) by the average amount of credit sales you made each day (\$1,000), and the resulting figure (47.5) tells you the number of days it took your business, on the average, to collect its accounts receivable. This figure, the turnover rate, tells you how many times your receivables turned during the period under study. If you normally ask for payment on a 30-day basis, and find that you have a period like this example—a 47.5-day time frame to collect your cash—you have a definite problem.

This figure can be graphed, and it's very helpful to examine its fluctuations over a period of time. Once you've gathered enough information on your own business, you'll most likely find your collection period will run within a specific range of days, except for those times of the year, like the tax season we're in right now, where someone else gets the payments you should be receiving. You might discover, for example, that on the average your collection period is 30 to 35 days. In effect, this means you can expect payment within that period for most invoices you send out. But you might also find that during certain periods of the year, the slow

Address correspondence to Gregory R. Glau, PO Box 1627, Prescott, AZ 86302.

times, your collection rate might move into the 50-60 day range.

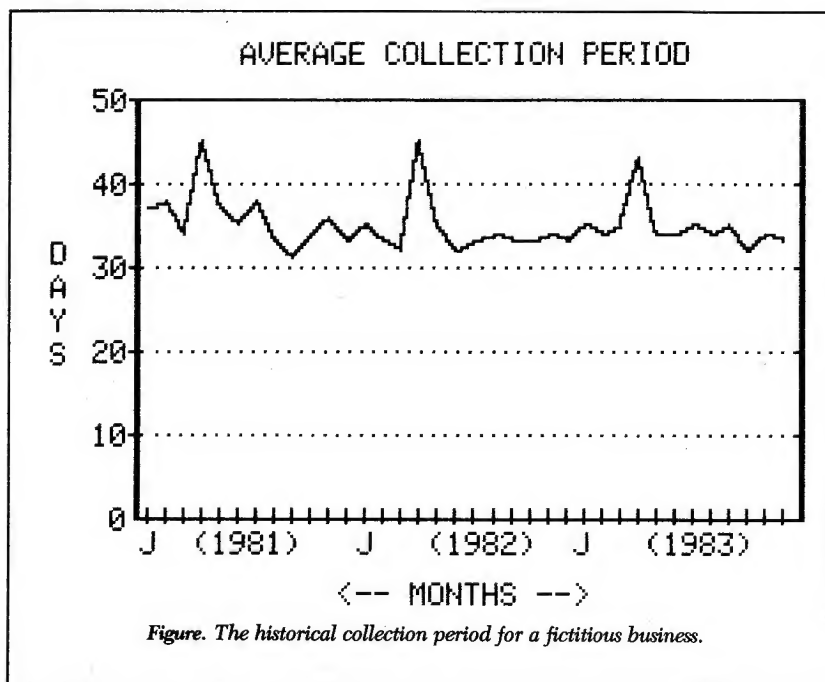
Obviously, to get a line on your true collection period, you'll have to track your information over a long enough period of time to know it's valid. The particular average collection period you calculate for your business isn't right or wrong, but applies to your own specific operation. Once you know what it is, you can decide if you want to try to change it.

The Figure illustrates what a long-range graph might look like for a business that doesn't collect much cash during income tax time. The data graphed cover the last three years. The scale marks, which run up the left side of the chart, along with the grid lines that run across the graph from each daily mark, were designed to help the user understand the information. It's easy to see that the normal collection period for this enterprise runs in the 30-40 day range.

The blips that pop up when April of each year arrives are obvious; collection really slows down when people are paying their taxes. If this were your business, this graph would telegraph you a warning to take some action to keep the cash coming into your business dur-

ing these slow periods. Perhaps a month or two before they arrive you can start to winnow out those customers who are slow to pay and make some phone calls to them. Maybe you can ask for a larger down payment, or more frequent payment dates, on the contracts you write. Perhaps you need to turn down work where there appears to be a credit problem. You might simply let each customer know, when you allow them to charge, exactly what your credit terms are, and what will happen if they get behind.

Once you determine your average collection period—the normal amount of time your business takes to collect for its work—you have a basis to go on to decide what actions are appropriate to help for those times where you have a cash problem. It's more vital than ever during those periods when outside forces seem to conspire against you when you try to collect your accounts receivable, when the cash simply doesn't come in, to know what your business can expect to do, and when it might have difficulty. Once you know how your business operates, you can take appropriate steps so the cash will be there when you need it. ■



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by Bill O'Brien

April Turnover

Some years back, Isaac Asimov defined the three universal laws of robotics. There was a need at that time because ever since the advent of pseudosentient mobile machines in a small tome titled *RUR*, robots had been scurrying about unkept. It seems appropriate, then, that after so many years of microcomputers, there should also be some laws governing the behavior of our precursor pets. Yet, no one has proposed any regulatory inhibitions for these creatures that have become incorporated into our daily lives with surprising ease. No one has until now.

The Laws of Micronics

Formation is hereby requested of a steering committee to be sponsored by the IEEE which will examine the proposed laws (see the Table), amend and adopt them as necessary.

The first law hardly needs explanation. We have all been victim at one time or another of some action like it. Likewise, the second law is also self-explanatory. Who hasn't had many hours of work utterly destroyed at the whim of the microcomputer?

The third law is somewhat more subtle. This rule covers not only the computer itself, but also any disk drivers, printers, modems, etc., that might be attached to it. I could ask for a show of hands from those who have inserted a precious disk into a

drive, closed the door and been rewarded with an error message. On retrieving the disk, visual inspection might reveal that the center ring had been bent or curled by the hub of the disk drive.

Or perhaps, in the middle of an important communicate, you have had your modem respond *no connection*. It's these and other such obstacles to progress that the Three Laws of Micronics seek to prevent.

New Products

The new year has brought with it a host of new products for the Apple III. From Optiques-Lique comes a bar code reader that connects to the RS-232 port. It will allow users to read bar labels even under low intensity light and adverse motor response conditions. Included in the kit is a backpack for the III, bar code reader, electronics and a 300 foot extension line for maximum portability. Those living further from a bar than that should contact the company directly.

A company called Strident Technologies has introduced a large storage device called the Maxifloppy. It connects in line with other Apple III disk drives and comes with its own driver routine that you install. Storage capacity is 10 gigabytes (1 bigabyte) per 23-inch disk. Shipments, by truck or freight only, will have begun

by the time you read this.

Mono-Audial, a French firm, offers a speech recognition device that attaches directly to the Apple III keyboard. The company claims that their product offers the latest in biogenic audio response centers combined with neural transient synapse carrier detect which will allow a variety of speakers to be heard and understood by the interface. Initial production units will only respond to French, but the company hopes to open an American facility sometime in the early portion of the third quarter. Interfacing to the III is accomplished through precisely controlled digital extensions. Cost is between \$15K and \$50K per year depending on options selected.

Finally, from Abashed-n-Late, Debased 8.1 for Softcard III users. This new release of the popular irrational database management package corrects all known errors in the previous seven releases. As in the past, new errors are expected and plans are under way for release of version 9.2. (Versions 8.2 through 9.1 will be created and corrected without release to the general public.)

Those are the most prominent pieces of software scheduled for release April 1st. Remember to check with your local computer store for pricing and availability. Some stores already have these items in stock.

And Now for the News

Ever since the Apple III first arrived, I've been using PFS for my minor database applications. For those of you unfamiliar with it, in its

1. A Microcomputer, at power-up, will not display unrecognizable characters nor cease the power-up procedure unless and until it is ready for use.
2. A Microcomputer shall not hesitate in its function after several hours of use unless or until the material worked upon has been correctly stored.
3. A Microcomputer shall maintain constant control on all symbiotic attachments and prevent such entities from causing harm.

Table. The Three Laws of Micronics.

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System requirements: Wildcard: Apple II + w/64K, Apple IIe, Wildcard 2: Apple II, II +, IIe, Wildcard Plus: Apple, II, II +, IIe. All cards work with Franklin computers. An \$8.00 mod kit is required for Franklin 1000, 1200 (for use with Wildcard only).

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AMPERGRAPH

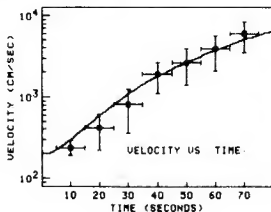
AMPERGRAPH is a powerful, easy-to-use relocatable graphics utility for the Apple II +/e. AMPERGRAPH adds twenty-two Applesoft commands that allow effortless generation of professional-looking plots of scientific or financial data. All of the necessary scaling and screen formatting is accomplished with just a few, simple Applesoft lines.

Unlike most other plotting systems for the Apple II which are stand-alone systems, the AMPERGRAPH utility provides extended BASIC graphics language macros that you can use directly in your own Applesoft programs. The additional commands are &SCALE, &LIMIT, &AXES, &GRID, &FRAME, &LOG X, &LOG Y, &LABEL AXES, &LABEL, &VLABEL, &CENTER LABEL, &CENTER VLABEL, &DRAW, &PENUP, &CROSS, &OPEN SQUARE, &CLOSED SQUARE, &OPEN CIRCLE, &CLOSED CIRCLE, &ERROR BARS, &DUMP (to dump the graph on a Silentyper printer) and &*DUMP (to link with AMERDUMP, see below).

\$45.00

SAMPLE AMPERGRAPH PROGRAM LISTING:

```
10 &SCALE, 0, 80, 80, 13000
15 LX$ = "TIME (SECONDS)":LY$ = "VELOCITY
(CM/SEC)"
20 &LOG Y: &LABEL AXES, 10, 10
25 LABELS = "VELOCITY VS. TIME":&LABEL, 30,
200
30 FOR T = 0 TO 80:&DRAW, T, 150 + T/2:NEXT T
35 FOR T = 10 TO 70 STEP 10
40 &CLOSED SQUARE, T,
(150 + T/2)*(8 + 4*RND(3))
45 &ERROR BARS, 5, T/2/2
50 NEXT T:&DUMP
```



AMPERDUMP

AMPERDUMP is a high-resolution graphics dump utility which can be used either in menu-driven mode, or directly from your Applesoft program, with, or without AMPERGRAPH. The following printers will work with AMPERDUMP: Epson MX-80, FX-80, MX-100; Apple DMP, NEC PC-8023A-C, C. ITOH 1550, 8510A/B, 8600. AMPERDUMP offers many features which are not available in other graphics dump routines:

- Horizontal magnifications: 3 with Epson printers (2.33 to 6.99 inches); 12 with all others (1.75 to 7.78 inches)
- Vertical magnifications: 9 with Epson printers (0.88 to 7.96 inches); 6 with all others (1.33 to 8.00 inches)
- Horizontal and vertical magnifications can be specified independently.
- Normal / Inverse dumps
- Adjustable horizontal tab
- Compatible with AMPERGRAPH
- Fast
- Easy to use
- Relocatable

\$40.00

The AMPERGRAPH and AMPERDUMP graphics utilities require an Apple II +/e (or Apple II with language card). The AMPERDUMP utility requires one of the following interface cards: Epson, Apple, Grappler, Interactive Structures, Mountain Computer, Epson Type2, Tymac, or Microbuffer II.

AMPERGRAPH and AMPERDUMP are available from your dealer or order direct. Include \$2.00 for shipping and handling; Wisconsin residents add 5% sales tax.

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latest incarnation, the Personal Filing System (hence, PFS) consists of three packages: PFS File, PFS Report and PFS Graph. Together, they describe a versatile DBMS (database management system) that will let you design your own input formats plus derived fields (information that is not implicitly entered, but derived by interacting with the information that is contained in one or more defined fields). As well, you can redefine a previously created input format if you find you've forgotten something.

PFS Report is a freeform report generating program that organizes PFS file data into coherent report formats. Titles are allowed, as are page breaks on keyed subject changes. PFS Graph, as you might suspect, lets you take the PFS file data and generate multiple graph formats. Together, they make quite a comprehensive program, but there are some limitations.

Data is entered freeform, with only the field titles described, so there is no control over the format of the information being input. A date, for instance, would be a prime example of a potential problem. There are a variety of ways that the information could be entered: 04/01/84; 04-01-84; or April 1, 1984. The combinations could go on.

Repetitive inputs, fields that may contain the same piece of information for a variety of successive records, are not dealt with at all. There is no shortcut available—the data must be entered in full each time. There are, however, simple ways of entering current time and date as stored in the Apple III reserved words TIME\$ and DATE\$.

The report generator cannot handle more than one title per report, although field names specified in the File portion can be redefined for a printed report and, in fact, report formats can be prespecified and saved for later use. It does implement item count, field subtotal for identical items and overall total for the field.

PFS Graph can accept the data and produce line, bar and pie charts with it; these can be printed on a va-

riety of printers and plotters or by using the PKASO or PKASO/U cards as I described in my December column.

They make a very easy-to-use database system, providing your needs don't reach beyond their capabilities. My problem is, after all this time, my DBMS requirements are still not immense, but they do reach beyond PFS. Fortunately, a solution is available.

The New

Brock Software Products of Chrysal Lake, Illinois, has introduced Keystroke, a relational database management package that is what PFS should have evolved into, and possibly would have, had they not diversified into graph functions, word processing and multiple computer formats. The term "relational" has been used in many ways regarding programs that collect and manipulate data. Its meaning here, and in general, is simply that Keystroke can cross-reference data from two related files.

Before you can create a form, Keystroke allows you the option of formatting a blank disk and assigning it a name. After that, you use a full featured menu, selecting options (create, delete, etc.) with the up and down arrow keys. Included are options for setting up subdirectories for the files you will be making. The individual function is also menu driven and alleviates the over-long filenames that can occur in PFS when you need to name the drive device, subdirectory and filename. Terms used include *drawer*, *folder* and *file*, familiar words in a business environment. Filenames in use are displayed at the "file" level. You don't have to mentally keep track of all the files you have made.

Forms are created much the same as PFS. You start with a blank "sheet" (the screen) and, using whatever titles you'd like for the field names, create the form. The colon character is used to mark the field name. Unlike PFS, when you create form titles at the top of the sheet in Keystroke, the titles are *not* printed in inverse. (PFS assumes that every character before a

colon is a field name and uses inverse printing to highlight them.) Also different is a field length definition and format feature. With Keystroke, a numeric descriptor is used just after the colon to indicate the field length, while additional characters can be used to format the input for dollar/cents, date, auto date, auto increment, Yes/No, phone or social security numbers, to name a few. You can also indicate preferred responses in all or a portion of a field and preselect search/sort fields as well. All of this is accomplished with the assistance, when needed, of "help-screens" available by pressing the open-apple and question mark keys.

A feature contained in Keystroke that PFS has never included is the ability to assemble keyboard macros—where one key can be defined as a combination of keys or words, to simplify and shorten the amount of entry time needed. Added to another feature, called "The Hand," which allows you to grab and move screen lines, Keystroke contains powerful editing tools that minimize the amount of time spent defining forms. If alignment of field names is a problem, Keystroke will also let you insert spaces or characters without retyping the entire name.

Of course, no DBMS would be worth its salt if it didn't have a report generator associated with it. Keystroke has, appropriately, the Report Generator. While there is some versatility in PFS, Keystroke Report Generator can be told to left, right or center justify. It will format in dollars and cents or accounting format with parentheses around negative numbers; and dates can be done in any of three styles, either strictly numeric (mm/dd/yy), mixed with the numeric date, the month name and a two digit year indicator, or in standard format with month name, numeric date and four digit year indicator. And all of these can be done on a per column basis.

But the list doesn't end there. You can, at your option, highlight a record or records by overprinting the information on your printer. You can add a title line, a subtitle line and/or

a footer (a line printed at the bottom of each page of the report). If you don't specify a footer, the Report Generator will just print the page number.

Of course, printing is much better when it's done to something and not just let out into the ether. Report Generator will let you print to disk, and although handy, it's no great deal. It will also let you specify which printer device you'll be using, and that, too, is no great shakes. But what about highlighting? What about doing expanded print? What about condensed print? You can specify all of your printer's characteristics. (If you happen to lie and tell it that underlining is really bold print, no one will know.) And, as you can in the database, you can define the whole process that went into printing your report as a single keystroke.

There are quite a few words to describe this set of programs, but the one that comes to mind immediately is depth. It has very good depth and quite a bit of forethought about what goes into a database to make it not only functional but also practical. Where PFS was simple, Keystroke is easy—and there's a very fine and proper distinction between those two words.

In their favor, Software Publishing, the originators of PFS, pioneered the way on the Apple II. They brought over PFS to the III, giving the machine its first real program apart from Apple supplied and sold articles. They've also supplied it for a few other machines, and that means they had to maintain portability and generality in its scope.

Brock, on the other hand, went straight for the carotid. They picked the best machine and used their skills to enhance their program by emphasizing all of the things that concentration allows. It just goes to show you what happens when you start out with a winner.

Apple III Plus

The postman might have been late with my Apple III Plus press kit last month, but Apple was early with the machine. It's sitting on my desk right

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now looking very familiar and still a little strange. Definitely don't go out and try to sell your current III—the differences aren't *that* great. One of the things that caught my attention was not the Apple directly, but a program that was sent along with it. Under "Requirements," it listed "...an Apple III with at least 256K of memory." Makes you wonder just a little, doesn't it?

Time is short just now, so you're not going to get the facts and figures. Just as a tease, let me mention that more than a few things have been rearranged and an honest-to-Apple delete key has been added. And the "on" indicator lamp now has a green filter over it. Next month I'll cover it in depth.

Add-Ons

Finally, it may be of interest to note that by the time you read this,

Apple may well be supporting Micro-Sci drives for the III. Although we covered those in February of 1983, just to review, they come in three flavors: A3, A73 and A143.

The first is a direct replacement for Disk IIIs. The second has double the storage, and the third is a two-sided drive with half a megabyte of space. They daisy chain just the same as current drives do, but require that the Micro-Sci driver be put in place of the standard Apple III disk driver and formatter. Micro-Sci also supplies a CP/M patch that lets them work with the Softcard III. It seems that CP/M didn't allow multiple levels of drivers (such as the standard Apple formatter with its + sections). There is a Submit (CP/M's version of EXEC) program on the disk that fixes this.

Again I suggest that those of you with ProFiles take a serious look at the

A143 as a means of backing up your data. Ten double-sided, double-density disks are a lot easier to cope with than 35 standard disks for a full 5M backup. For the dollar conscious, it's also cheaper than most tape backup devices and you can buy ten of the correct density disks for about the same price as a 3M DC-300XL tape cartridge.

Quark's Catalyst also supports the Micro-Sci drives; that will let you place even some copy-protected programs on them and run whichever you want from a menu, rather than having to boot multiple disks. This works the same as it would if you had a ProFile or other hard disk. It looks like this year is going to be a real plus for the Apple III!

Remember, be here next month for the Apple III Plus exposé, and in the meantime, live long and program.

Ciao bene, AppleAmerica. ■

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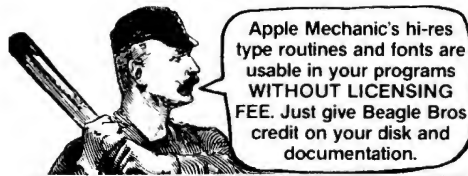
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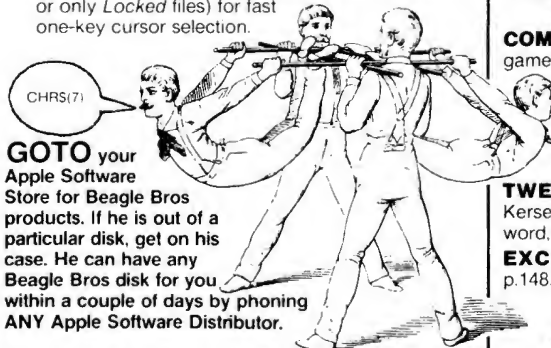
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10 LIST: LIST: LIST: FOR ZZ-PEEK(175)+PEEK
(176)*256+36 TO 3072: POKE ZZ,216: NEXT
20 FOR XXX=1 TO 2: POKE-16299,0: POKE
-16300,0: XXX=1: NEXT: REM Experiment
with different length variable names.

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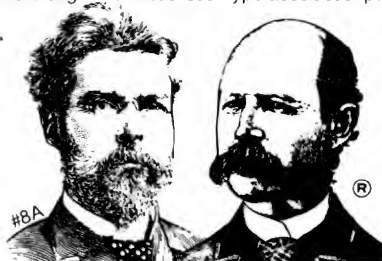
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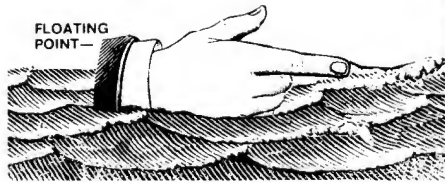
GLOBAL SEARCH & REPLACE: Find any word or variable in your programs, FAST. For example, find all lines containing a GOSUB, or edit or delete all lines with REM statements, or all occurrences of any variable. **Replace any variable,** word or character with any other. For example, change all X's to ABC's, or all "Horse" strings to "Cow".

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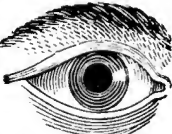
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POKE S.A: NEXT: POKE 232.0:
POKE 233.3: DATA 1.0,4.0,5.0
2 HGR2: FOR R=0 TO 192: ROT-R:
SCALE-96: XDRAW 1 AT 140.95:
SCALE-30: XDRAW 1 AT 140.95:
S-PEEK(49200): NEXT: RUN

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SAVE 60-SECTOR PROGRAM	24 sec.	9 sec.
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MANY USES: For example, auto-load often-used files like FID etc., etc., into RAM when you boot up, so they are always available when you need them. Copy files from RAM onto disk and vice versa, just as if a disk drive were connected to slot #3.

FRIENDLY & COMPATIBLE with 80-column display, GPLE, ProntoDOS, and all normal Apple-soft and DOS commands and procedures. Will not interfere with Apple IIe "Double Hi-Res" graphics.

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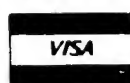
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The Applesoft Random Number Bug

by Bob Bragner

If you've ever had the feeling that you've played an Applesoft game the same way before, you may have been right. If your Apple has both Integer and Applesoft Basic available, the Applesoft Random Number Generator (RNG) is affected curiously by the presence of DOS together with commands such as INT and FP.

Turn your machine off and then on. You may let DOS boot, or prevent it from doing so by hitting control-reset—it makes no difference. (If your machine is an Integer Basic ROM Apple II with a language card, you'll have to let DOS boot in order to load Applesoft.) Make sure you're in Applesoft; then enter the monitor, type C9.CD and press return. You will see 80 4F C7 52 and a fifth byte that will vary from machine to machine. (My II+ always has a \$FF here, and my IIe always has a \$00.) These five bytes are the floating-point representation of your machine's Applesoft random number "seed." Try this procedure several times to convince yourself that you always get the same five bytes there.

Turn your machine off and repeat the above experiment. From Applesoft, type ?RND(11) (the number in the parentheses doesn't matter as long as it's greater than 0) and you will see a value. Write it down. Repeat this procedure. You will get the same value each time. This means that, whenever you turn on your Apple, this is the number that your Applesoft Random Number Generator is seeded to produce.

Turn your machine off, then turn it on again and let DOS boot. From Applesoft, type ?RND(11) and you should see the number you saw before.

Now, type FP ?RND(11). Write down the number you see. Do this again and compare the on-screen number with the number you wrote. A DOS FP appears to reset the RNG to the last-used random number.

Load Integer Basic if it's not already in your machine. Type INT FP ?RND(11). You will always get .289653246. Type FP again and now you will always get .375480746. All these problems are the fault of a conflict in page 0 use between Applesoft, Integer Basic, and DOS, along with a bug in the Applesoft Random Number Generator.

Applesoft's RNG uses five locations in page 0 (\$C9.CD or 201-205) to generate random numbers. Integer uses \$C9 as a temporary storage for the y-register. \$CA.CB is the Integer Basic program pointer; it points to HIMEM if no program is present. \$CC.CD is the Integer Basic current variable pointer; it points to LOMEM if no program is present. After an INT, \$CA.CB will normally contain \$00 96 (the beginning of DOS) and \$CC.CD will normally contain \$00 08 (the beginning of the variable table). \$C9 usually contains a \$0A. These locations will change every time a program line is changed or a variable is referenced from Integer.

That explains why INT messes up

the RNG. It doesn't explain the problem with FP, nor does it explain why the machine contains the same bytes in those five locations even when Applesoft is cold-started with an FP, with a control-B from the monitor, or by turning on the machine. Finally, why are four of the bytes the same on all machines, and the fifth different?

The code for the Applesoft cold-start procedure which wipes out variables, resets pointers and builds up the CHRGET routine that lives at \$B1.C8 begins at \$F128. The portion that interests us begins at \$F150 in the Applesoft ROMs:

```
F150 — LDX #$1C
F152 — LDA $F10A,X
F155 — STA $B0,X
F157 — STX $F1
F159 — DEX
F15A — BNE $F152
F15C — STX $F2
```

The routine is plain enough: the x-register is loaded with #\$1C (decimal 28). The contents of a table beginning at \$F10A are moved one at a time to their proper locations in page 0. The contents of the x-register are repeatedly stored at \$F1, which is the byte that controls the speed of the output (by the SPEED= command). At the end of the routine, this location will contain a 1. Finally, a 0 is stored at \$F2, the TRACE flag, disabling TRACE should it have been in effect.

Write Bob Bragner at Kandilli, Iskele Caddesi 49/3, Istanbul, Turkey.

If you add \$1C to \$B0 you get \$CC (decimal 204). That means that during a cold start, Applesoft always seeds the first four bytes of the random number generator with the contents of \$F123.F126, which are \$80 4F C7 52. The value in the fifth byte (location \$CD) seems to depend on your Apple when it is first turned on, but, as we've seen, Integer Basic affects that byte.

Why is it this way? Who knows? But I have a theory. The ASCII values of those first four bytes are "OGR" with the high bit in the R turned off. Is it possible that some long-forgotten programmer has been impregnating countless Applesoft RNG's with his initials all these years? Another, less-colorful, theory has it that the \$1C at location \$F151 should have been a \$1D, and that five bytes, not four, were supposed to have been transferred to \$C9.CD during a cold start. The fifth byte is \$58 or an X with its high bit turned off. (That kind of knocks down the initials theory.) Altogether, the five bytes give a floating point-value of .811635157. Why that exactly? Was one of the programmers named Xavier? And why have a fixed seed for a RNG in any case?

This problem also occurs if you

load or run an Applesoft program with Integer Basic up. From Applesoft, save the following one-liner on disk under the name RNDBG:

```
10 PRINT RND(11)
```

Enter Integer with INT, type RUN RNDBG and you will see .289543246. Now type INT LOAD RNDBG RUN. You will see the same thing.

Loading or running an Applesoft program from Integer must cause a DOS FP to take place before the program is actually loaded from the disk. This is a matter of some concern to owners of the original Apple II—the one with Integer Basic on the mother board—since their machines always start up in Integer Basic.

One more test and we're done. Type INT FP RUN RNDBG and you will get .375480746. FP only resets \$C9.CC; byte \$CD, which INT sets to \$08, is unaffected during a cold start. On the other hand, loading or running an Applesoft program from Applesoft (with or without typing NEW) and without typing FP does not affect the RNG since Applesoft is not cold-started.

In practical terms therefore, *always* initialize Applesoft's RNG before using it the first time in a pro-

gram. Apple published the reseeding procedure years ago, though they didn't give a reason for it. Put this line at the beginning of every Applesoft program which may use the RNG:

```
10 R = PEEK(78) + 256*PEEK(79):R = RND (-R)
```

This patch is equivalent to the RANDOMIZE statements found in some Basics and Pascal. Locations 78 and 79 are the monitor's RNG; the value you pick up from there is effectively random. However, you must only do this *once* during an Applesoft program, preferably at the beginning. Doing it a second time may reset the RNG to what it was at the beginning of the program—the monitor cannot update these two locations while Applesoft is in charge of things unless the Applesoft program tries to get input from the keyboard. Reseeding the RNG during a running program with this method will work after an Applesoft GET or INPUT *from the keyboard*: GETs and INPUTs from disk files do not cause the monitor RND locations to change.

Since Integer Basic's RNG uses the two monitor locations \$78.79, its own random numbers are truly random (or at least truly pseudo-random) and in no way are they affected by DOS. ■

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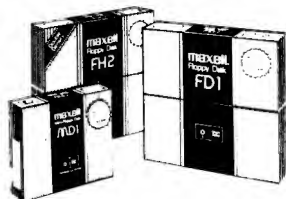
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Featuring an Apple II-compatible parallel interface, Addmaster Corporation has produced a new dot matrix printer, Model 170. The interface includes a Centronics-type handshake and DB-25 interface connector, Baudot, and day — and time clock. The Model 170 provides 18 or 21 characters per line, 6 lines per inch print density, on standard 2 1/2" adding machine tape. Designed to use with personal computers, Model 170 will produce hard and carbonless copies of programs, data or results. Write Addmaster Corporation, 416 Junipero Serra Dr., San Gabriel, CA 91776 or call 213/285-1121.

Personalize Your Disks

by Jim Segrist

Would you like to have your name or personal title appear whenever anyone issues a CATALOG command when the system is booted with your disk? This program will POKE your 12-character message into the locations that DOS reserves for the header "DISK VOLUME." Note that the disk volume number is still displayed.

DOS, on units with 48K or more memory, uses locations 45999 to 46010 to store the title which appears just before the volume number whenever the CATALOG command is issued. To change this title you must POKE the noted locations with the new message. Once you do this, load the desired Hello program into memory and then initialize the disk. You also can use any one of several copy programs which can rewrite DOS to modify your existing disks without affecting the programs on the disk.

Lines 90 through 140 PEEK the locations and display the DOS header contained in memory. The display has three columns: the memory location, the ASCII code for the character, and the character that code represents (see Figure 1). Figure 2 shows the display when "YOUR TITLE" has been entered as the new title. Figure 3 shows the display when the CATALOG command is issued.

Lines 210 through 260 will accept

Lines 210 through 260 will accept

```

46010 196 D
46009 201 I
46008 211 S
46007 203 K
46006 160
46005 214 V
46004 207 O
46003 204 L
46002 213 U
46001 205 M
46000 197 E
45999 160
DO YOU WISH TO CHANGE THIS?
  
```

Figure 1. The monitor display, showing the memory location, the ASCII code for the character and the character that code represents.

```

46010 217 Y
46009 207 O
46008 213 U
46007 210 R
46006 160
46005 212 T
46004 201 I
46003 212 T
46002 204 L
46001 197 E
46000 160
45999 160
DO YOU WISH TO CHANGE THIS?
  
```

Figure 2. The monitor display showing "YOUR TITLE" as the title.

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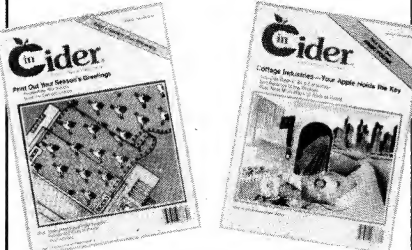
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your title and POKE it into the required locations. Do not use Return as a space; it issues a line advance instead of just a space. The inputs from the keyboard begin with an ASCII value of 0 while the DOS header values begin at 128; therefore we must add 128 to the keyboard value before it is POKED. This is accomplished in line 220.

Caution: Some programs modify DOS to enhance their operation or to prevent copying. Transferring or changing the DOS locations may make the program inoperable. ■

Address correspondence regarding this article to Jim Segrist, 795 Null Road, New Cumberland, PA 17070.

```

1CATALOG
YOUR TITLE 254
A 008 HELLO
    
```

Figure 3. Here is what the display shows when the CATALOG command is issued.

```

-60 REM * DISK TITLE MODIFICATION *
-70 REM * BY JIM SEGRIST 4/23/83 *
80 DIM A(12)
90 HOME : PRINT "EXISTING DOS TITLE IN MEMORY.": PRINT
100 FOR A = 46010 TO 45999 STEP - 1
120 PRINT A" " PEEK (A)" " CHR$ ( PEEK (A))
130 NEXT A
-140 INPUT "DO YOU WISH TO CHANGE THIS?";A$
-150 IF LEFT$ (A$,1) = "N" THEN GOTO 400
-200 PRINT : PRINT "ENTER THE 12 CHARACTERS YOU WISH ON THE DISK HEADER"
-202 PRINT : PRINT "DO NOT PRESS THE RETURN KEY. USE THE"
-203 PRINT "SPACE BAR TO INSERT A SPACE OR TO"
-204 PRINT "COMPLETE THE 12 CHARACTER STRING."
210 FOR A = 1 TO 12
220 GET A$: PRINT A$:A(A) = ASC (A$) + 128
230 NEXT A:A = 0
240 FOR B = 46010 TO 45999 STEP - 1:A = A + 1
250 POKE B,A(A)
260 NEXT B
-270 INPUT "DO YOU WISH TO CHECK?";A$
-280 IF LEFT$ (A$,1) = "N" THEN GOTO 400
-290 GOTO 90
-400 HOME : PRINT "THE DOS IN MEMORY NOW HAS YOUR PERSONAL TITLE."
-410 PRINT : PRINT "IF YOU INITIALIZE A DISK NOW, IT WILL CONTAIN YOUT TITLE."
-420 PRINT : PRINT "YOU MAY WISH TO LOAD YOUR HELLO PROGRAM FIRST."
-430 END
    
```

Program listing. Disk Title Modification.

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DOS Commands Turn the Trick

by Ed Jackson

Error messages are very nice, but *some* errors don't give you any message or apology. The program *just doesn't work!*

I had a problem the other day that took me quite a while to solve. The program I had built did a series of one hundred calculations, turned on the printer, printed the results, turned the printer back off, and then went back to do one hundred more calculations. It worked perfectly until I added an interrupt feature to stop the program and to access the disk to run the menu for an overall program. No matter what I did, instead of running the menu it simply

printed RUN MENU on the screen.

The problem was that the Applesoft commands to PR#1, which is where my printer is, and PR#0 to turn the printer back off, were just that—Applesoft commands. The DOS command system gets very huffy if orders are placed behind its back and refuses to listen to anything more you have to say.

Well, the answer is always (almost) in the book... if you look for it long enough. *The DOS Manual* says that when Applesoft addresses some other slot, it partially unhooks the disk operating system. The way around this problem is to let the DOS

command system issue the orders, as in the program listing. Do it, and everything works fine! ■

Address correspondence to Ed Jackson at 4100 Fairlane, Fort Worth, TX 76119.

```
50 D$ = CHR$(4)
100 PRINT D$;"PR#1": REM TURN
    PRINTER ON
200 PRINT D$;"PR#0": REM TURN
    PRINTER OFF
```

Program listing, DOS printer commands.



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Simple Variable Dump

by Timothy Corica

To show my advanced programming class how information is stored in the Apple, I had to puzzle out the locations and coding schemes used. A subroutine resulted which prints out the values of all simple (non-array) variables currently in use, including those set to zero. Such variable dumps have been familiar friends to users of mainframe computers. Their value in debugging can be exceptional.

To use the subroutine, you must append it to the program being debugged. This can be done using the merge feature of the RENUMBER utility. However, it is time-consuming to load RENUMBER and perform the required operations. It is easier to store the subroutine as a text file to be EXECed when needed. Do this by typing in the program with the following additional four lines:

```
10 PRINT CHR$(4); "OPEN VP"
20 PRINT CHR$(4); "WRITE VP"
30 LIST 50000-
40 PRINT CHR$(4); "CLOSE VP"
50 END
```

Then, when the program is run, a text file of the subroutine is created on disk. When it is needed, the programmer types EXEC VP, and it will be added to the program in current memory. This program should then be saved in case it is needed later.

The subroutine can be used in numerous ways. The most obvious is to call it from within the program, e.g., 200 GOSUB 50000. This will not interrupt program execution, but merely cause a pause until the subroutine's work is complete. A more useful call might include a line number and an INPUT to stop execution:

```
200 PRINT "AT LINE 200": GOSUB 50000:
INPUT "HIT RETURN TO CONTINUE";
QQ$
```

Even quicker would be 200 GOSUB 50000:STOP, with a CONT command to resume execution. Alternatively, if an INPUT is always desired, it could

be inserted in line 50063 in the subroutine.

The subroutine can also be called in the event of an abnormal end. If an error, reset, or control-C stops the program, GOSUB 50000 can be issued from immediate mode. Make this process automatic by beginning the program with ONERR GOTO 50000 and changing the RETURN to END. I have found, however, that ONERR statements in not-yet-debugged programs

cause more heat than light.

Since the routine is in Basic, it will not interfere with any machine-language routines in use, nor should it be prone to any other surprises. It does, however, use variable names Z1, Z2, Z3, Z4, and Z5, so their values will be changed. They should not, therefore, be used in the main program. ■

You can write to Tim Corica at 95 Princeton Arms North, Cranbury, NJ 08512.

```
50000 REM VARIABLE PRINT SUBROUTINE
50005 Z1 = PEEK (106) * 256 + PEEK (105): REM START OF VARIABLE STORAGE
50010 REM *****
50015 REM START OF LOOP
50020 IF Z1 > = PEEK (108) * 256 + PEEK (107) THEN RETURN : REM END OF SIMPLE VARIABLE STORAGE
50025 REM LINE 50030 AVOIDS VARIABLES USED IN THE SUBROUTINE ITSELF
50030 IF PEEK (Z1) = ASC ("Z") AND PEEK (Z1 + 1) < ASC ("6") AND PEEK (Z1 + 1) > ASC ("0") THEN 50055
50035 PRINT CHR$ ( PEEK (Z1)); CHR$ ( PEEK (Z1 + 1)); REM PRINT VARIABLE NAME
50040 IF PEEK (Z1) > 127 AND PEEK (Z1 + 1) > 127 THEN GOSUB 50155: REM INTEGER
50045 IF PEEK (Z1) < 128 AND PEEK (Z1 + 1) < 128 THEN GOSUB 50075: REM FP
50050 IF PEEK (Z1) < 128 AND PEEK (Z1 + 1) > 127 THEN GOSUB 50185: REM STRING
50055 Z1 = Z1 + 7
50060 GOTO 50020
50065 REM RETURN TO TOP OF LOOP
50070 REM *****
50075 REM FLOATING POINT
50080 REM Z2 IS CURRENT TOTAL OF MANTISSA
50085 REM Z3 IS THE FRACTIONAL PLACE (E.G. 1/128TH PLACE)
50090 Z3 = 128: Z2 = 1
50095 REM LOOP TO COLLECT FRACTIONS
50100 FOR Z4 = 3 TO 6
50105 Z5 = PEEK (Z1 + Z4)
50110 IF Z4 = 3 AND Z5 > 127 THEN Z5 = Z5 - 128: REM NEGATIVE NUMBER
50115 Z2 = Z2 + Z5 / Z3
50120 Z3 = Z3 * 256
50125 NEXT Z4
50130 Z2 = Z2 * 2 ^ ( PEEK (Z1 + 2) - 129): REM MULTIPLY EXPONENT BY MANTISSA
50135 IF PEEK (Z1 + 3) > 127 THEN Z2 = - Z2: REM NEGATIVE NUMBER
50140 PRINT " ", Z2
50145 RETURN : REM FROM FLOATING POINT
50150 REM *****
50155 REM INTEGER
50160 Z2 = PEEK (Z1 + 2) * 256 + PEEK (Z1 + 3): REM FIND UNBIASED VALUE
50165 IF PEEK (Z1 + 2) > 127 THEN Z2 = Z2 - 2 * 32768: REM BIAS BY 65536 IF NEGATIVE
50170 PRINT "Z", Z2
50175 RETURN : REM FROM INTEGER
50180 REM *****
50185 REM STRING
50190 PRINT "S",
50195 Z2 = PEEK (Z1 + 3) + PEEK (Z1 + 4) * 256: REM POINTER TO START OF STRING IN STRING MEMORY
50200 Z4 = PEEK (Z1 + 2): REM LENGTH OF STRING
50205 REM LOOP TO PRINT EACH CHARACTER OF STRING
50210 FOR Z3 = Z2 TO Z2 + Z4 - 1
50215 PRINT CHR$ ( PEEK (Z3));
50220 NEXT Z3
50225 PRINT
50230 RETURN : REM FROM STRING
50235 REM *****
```

Program listing. Simple Variable Dump.

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inSidious inSolubles Solution, from p. 93

Solution to The Banner

```
20 FOR H = 40 TO 1 STEP - 1
70 FOR H = 2 TO L: C = C + 1: VTAB
  V
120 C = 0: GOTO 20
240 POKE - 16368, 0: END
```

There were several errors. Take things "one step at a time" in line 20. I don't know where "K" came from in line 70. Try L. C must be reset to 0 before restarting the loop. One way is to add this to line 120. As a final touch, reset the keyboard strobe by a simple poke in line 240, so your screen isn't left with an unwanted character when the program terminates.

If you are organizing, or otherwise know of, an event important to Apple users, and would like it listed in the inCider Calendar, please drop us a line at Pine St., Peterborough, NH 03458. Include the name of the event, the date, the location, and the name of a contact for further information.

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Cider Vinegar

A Type Command for DOS, December

There are two errors in my article, "A Type Command for DOS," published in the December issue of *inCider*. I would like to credit Leonard Brady and Richard Wissbaum for pointing them out.

The first error is on page 144, in the third paragraph of Method 3. When I moved the routine from \$BA69 to \$BCDF, I neglected to change an address there. Therefore, the last sentence of the paragraph should read, "Instead of the addresses given in steps 2 to 4 above, make the modifications at \$2E1B instead of \$AD1B, \$18DF instead of \$BCDF, and \$2A02 instead of \$A902."

The second problem arises because the COUT routine, which displays characters on the screen, occasionally returns with the carry flag set. This

causes VERIFY to stop prematurely when reading the file. The solution to this problem is to add the instruction CLC (18) just prior to the RTS instruction in Listings 1 and 2. This also necessitates changing the branch instruction at \$BCEA to BCS \$BCFF (B0 13) and the branch instruction at \$BCF1 to BNE \$BCFF (D0 0C) in Listing 1. In Listing 2, change the branch instruction at \$BA79 to BCS \$BA8E and the instruction at \$BA80 to BNE \$BA8E.

William G. Wright
4591 Jamboree St.
Oceanside, CA 92056

I have a Smarterm II in my Apple and I use control-U as the underline token in my text files. However, the control-U's kick my 80-column card back into 40 columns whenever I review my text files using the modified VERIFY command. Since I didn't

want to change the underline token in my text files, I decided to insert a few bytes into the VERIFY subroutine that would keep certain characters from being sent to the COUT routine. See the Listing.

Of course, you will have to increase the offset in the branch commands at \$BCEA and \$BCF1, depending upon the number of characters you wish to check for.

George Tylutki
PO Box 73
La Plume, PA 18440

BCF4- B1 42	LDA (\$42),Y
BCF6- C9 95	CMP #\$95
BCF8- F0 03	BEQ \$BCFD
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Listing. Modification to VERIFY subroutine.

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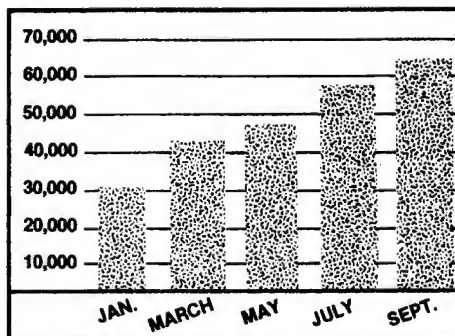


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Book Reviews

40 Easy Steps to Programming in Basic and Logo

by James Poirot and R. Clark Adams
Sterling Swift Publishing Co.
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Austin, TX 78744
Softcover, \$3.95

Would you like to learn two computer languages in just 40 easy steps? It's possible with the help of James Poirot and R. Clark Adams, authors of *40 Easy Steps to Programming in Basic and Logo*. Adams and Poirot have written a 64-page book for the beginning computer programmer. Their book, designed to be used with an Apple II system, provides instruction through a "learn by doing" approach in the two popular microcomputer languages of Basic and Logo.

Forty Easy Steps begins with a seven-page introduction perfectly suited for the computer neophyte. Topics such as turning on the computer, using the keyboard and initializing a disk are covered in explicit detail. A page of widely used computer terms such as memory, hardware, input, etc., is included with concise, readable definitions.

Parts II and III of the book are devoted to teaching programming in Logo and Basic respectively. Part II contains five lessons on Logo that cover the following topics—Turtle Graphics; Procedures; Variables; Recursion and Conditional Statements; and Numbers, Lists, and Assignments.

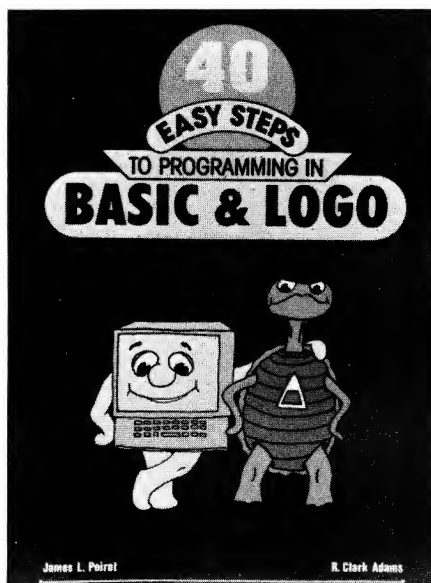
In Part III, five lessons are given in Basic on the following topics—Simple Basic; Loops and Graphics; Nested Loops and More Graphics; Decisions and Games; and finally Subroutines and Sounds. Every lesson has several steps involved with it, hence the name *40 Easy Steps*. At the end of each part, the authors include a one-page Summary of Commands and two pages of Assignments.

The format is well organized, explicit and easy to follow, and the style

is certainly clear and readable. Children from the third or fourth grade level and on should be able to read the book independently.

The authors' approach is certainly a "learn by doing" one. Each lesson gives examples and small projects for the reader to type in. To use the book correctly it should be read while in front of a computer. Because of this kind of tutorial approach, however, some of the lessons seem to lack enough detailed information.

An example is the Logo lesson on variables and recursion. No definition of a variable is given. After one simple example of a procedure using one variable, a sample procedure with three variables is offered for the reader to try. Also, no troubleshooting messages are included, nor pictures of expected output.



The intent is, of course, to lead students to discover things on their own, but only confusion may result if they have to generalize rules from inadequate background information. The task may be especially difficult for someone working on his or her own.

Poirot and Adams have suggested three possible uses for *40 Easy Steps*—as a student handbook in computer camps, as a home-study resource for children and parents, and as a text or supplement in a classroom. All three

seem appropriate to the format and style of the book. ■

Janet O'Neill
Nashua, NH

CP/M Bible The Authoritative Reference Guide to CP/M

By Mitchell Waite
and John Angermeyer
Howard W. Sams & Co.
4300 West 62nd St.
Indianapolis, IN 46268
Softcover, \$19.95

Most of us who use CP/M found ourselves suffering from a love/hate relationship at first. We love the wide range of application programs available in CP/M, but we hate to struggle with the system. For the novice, saying that CP/M can be frustrating to use is a large understatement.

Historically, CP/M was probably the first accepted standard operating system that was interchangeable among different brands of microcomputers, providing the microcomputer had an 8080 CPU (central processing unit). Today, almost all successful personal computers use CP/M. On the Apple, you can install a Z-80 board in the computer and take advantage of the large number of CP/M based programs.

Now, thanks to the *CP/M Bible* by Waite and Angermeyer, we should all find CP/M a little easier to use. The entire book is designed to be easy-to-use, from the content to the actual layout. I wish all computer user manuals were as well thought out as this book is! The book covers CP/M versions 1.3 through CP/M-80 2.2, and includes an overview of CP/M 3.0.

The preface starts off with a short description of CP/M and its history, then gives you a brief overview of the book's contents. The next few pages are an Information Jump Table, allowing you to quickly find a particular topic. This may seem odd at first reading, but this layout is superb for the book's true use as a comprehen-

sive reference manual.

The table of contents is enhanced by thumb tabs that take you to the exact page a particular subject is located on. All the built-in and transient commands are explained as well as the utilities.

The potential user of the *CP/M Bible* will find reading the introductory section in Chapter 1 a good way to quickly determine how well this book is geared to the CP/M user's needs.

The first 66 pages of the book cover the background and use of CP/M information. The remaining 430 pages cover each command in detail. If you only want to know about the DIR command, then you turn to the section on that command. The same holds true for all the available CP/M commands, built-in commands, transients and utilities.

A large set of appendices cover optional utility commands and information on CP/M compatible languages as well as related operating systems. An annotated bibliography is included as well as a glossary, prompts, error messages and a command summary.

The book calls itself *the* authoritative reference guide to CP/M; in this case, I feel it more than lives up to its claims. I found out several things I didn't know I could do, as well as cleared up some problems I had experienced using certain functions.

One final note. There are two companion books available from Sams (*The CP/M Primer* by Stephen Murtha and Mitchell Waite and *The Soul of CP/M* by Mitchell Waite and Robert LaFore) that augment the reference material contained in the *CP/M Bible*. I read these two books in conjunction with the review of the *CP/M Bible* and they are equally well written. The three books should meet the needs of just about all CP/M users.

If I were to have only one reference manual for CP/M in my personal library, it would be the *CP/M Bible*. Waite and Angermeyer did us all a great service by preparing this reference book for the CP/M user. ■

Peter Callamaras
Scott AFB, IL

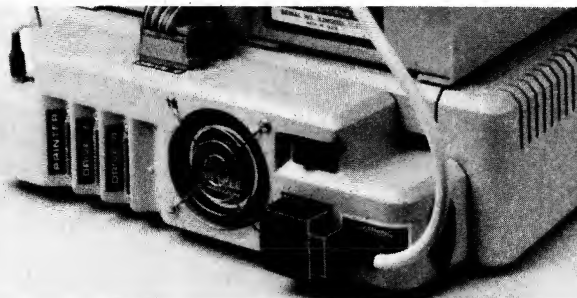
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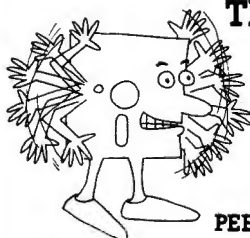
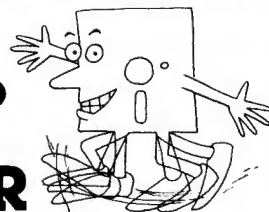
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Hardware Reviews

The Vista V1200

Apple users, such as myself, who began with 16K of memory and storage on a cassette tape recorder may find it difficult to believe that the 250K of storage available on two disk drives can become confining. But it can. As programs become more complex and powerful, they require more disk space—at times, at an alarming rate. About six months ago I began to search for ways to expand my disk storage space.

Anyone in this situation faces a variety of difficult choices. For about \$300 each, you can add additional Apple-compatible disk drives. Each additional drive adds about 120K of on-line space—not a huge amount, but not trivial either. If you go this route, there are few compatibility problems: DOS, CP/M and Pascal are all designed to take advantage of the extra drives (up to a total of 6 for DOS and Pascal, more for CP/M). But one disadvantage is the relatively high cost per kilobyte of storage. And some program files, such as PFS and dBase II, cannot exceed a single disk.

All of the alternatives require buying higher capacity disk drives. The cost ranges from about \$450 (for a 300 KB, 5 1/4-inch floppy) to well over \$2500 (for a 10 megabyte hard disk with decent backup capabilities). Although the cost of individual devices is higher, the cost per kilobyte of additional storage is lower than with Apple drives. However, there is an additional price: no matter what the choice, there is some sacrifice in compatibility. All such drives require patches to DOS, Pascal and CP/M operating systems in order to use the extra storage space available. Some of the high capacity 5 1/4-inch drives can be used as regular and fully-compatible Apple drives without the patches. But the more exotic alternatives cannot. The result is that many DOS programs do not run with the new drives; and there may be problems with CP/M

and Pascal as well. Moreover, in many cases, the new drives require special disks that cannot be used in the ordinary Apple drives.

I finally settled on the Vista V1200 from Vista Computer, 1317 Edinger, Santa Ana, CA 92705. The V1200 stores data on special, high-density 5 1/4-inch floppy disks in a cartridge containing five disks. Each disk holds 1.2 megabytes of data: thus, although only one disk can be accessed at a time, the total on-line capacity is 6 megabytes (approximately the data storage capacity of 50 Apple disks). The list price is approximately \$1500 (cartridges are about \$75), but Vista is available for about \$1200 by mail order. In most localities, there will be no dealers demonstrating, selling or servicing the drive.

Installation

The V1200 arrives in a large box containing the drive itself; a controller card and (long) cable; a manual (60 pages plus appendices); one cartridge pack containing five Vista disks; and several disks to make the required patches to DOS, CP/M and Pascal.

Although you will not be up and running in minutes, installation is relatively easy and the manual is clear. At least one regular Apple disk drive is essential for installation. The V1200 can be configured to operate as the only disk drive under DOS and Microsoft CP/M (not Pascal or PCPI's CP/M), but installation always requires another disk drive. With the power off, you attach the cable and plug in the controller, then plug the controller cable into the Vista. The Vista itself has its own power supply and must be connected to a source of AC power. With a program supplied by Vista, you format the five blank disks for DOS, CP/M or Pascal; you can mix and match different formats among the five disks in one cartridge.

For DOS, you should have a copy of the System Master. A program provided by Vista uses DOS to create its own patched DOS and also patched FID so you can transfer files

to and from the Vista disks. Vista also supplies an additional DOS patch—Quickcharge—that speeds DOS LOAD and BLOAD (but not text file manipulation) considerably. At this point you are ready to run.

Installation with Microsoft CP/M is similar. Installation with PCPI's Appli-Card requires an additional disk, available from Vista for \$10, and use of PCPI's own Install program. The V1200 will not function with the ALS card's CP/M 3.0. I have been unable to determine compatibility with other CP/M cards.

Installation with Pascal requires making patches to the operating system. Vista is currently rewriting these patches, and they promise free updates for the software. At the moment, however, you cannot configure Pascal to boot from the Vista (although the Vista can become the root volume), and only four of the five disks can be accessed. The Apple disk drives are designated 4: and 5:, until the new software is developed.

All in all, it takes about an hour to get up and running; it takes a little more time if you are configuring the drive for all three operating systems. Additional time will be needed to transfer files from your old disks to the new ones.

Operation

The Vista contains its own power supply, fan and on-off switch. It can be plugged into a switch and turned on automatically every time the Apple is powered up. This is probably the best choice if you use it routinely because the Vista on-off switch is at the back of the drive—a two-foot reach.

The Vista spins the disk continuously; however, the controller card contains circuitry designed to cut disk wear by replacing the disk in the cartridge, if it has not been accessed for about 20 seconds. When the disk is next accessed, there is a two-second delay while the picker retrieves the disk. In operation, there are occasional squeaks and hums as the head mechanism moves back and forth over the disk.

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V1200 appears as five large capacity disk drives—exactly, in fact, like double sided, double density 8-inch disk drives. Any one can be accessed, but changing from one to the other requires that the Vista replace the current disk in the cartridge and get the new one. On occasion this can take as little as two seconds (the time specified by Vista); more often, it takes five or even ten seconds to the accompaniment of soft grunting noises. What this means is that operations that require switching among two or more of the Vista disks are best avoided.

Disk access time is fast, but not notably faster than normal—except in DOS. Individual disks can be removed or moved around in the cartridge pack; if an individual disk fails, it can be replaced individually. And since the boot disk is always the top one, you can change boot disks

(from DOS to CP/M, for example) easily.

DOS

Operation under DOS is quite good; the only problems are compatibility and, to a lesser extent, backup of disks.

Compatibility with existing software is a serious problem when operating under DOS. Copy-protected programs, of course, cannot be run from the V1200 unless you can break the copy protection. A more serious problem is the fact that much commercial software cannot use the Vista for data storage. Programs (such as VisiCalc) that use their own DOS do not work because booting the program destroys the Vista DOS. Even programs such as Screenwriter II and General Manager, which will work with the Vista DOS in the machine, do not allow storage of text or

“...more often, it takes five or even ten seconds to the accompaniment of soft grunting noises.”

data on the Vista disks. (General Manager is presently testing a revision that will be compatible with the Vista and Rana Elite drives; it should be available shortly.)

In general, programs that use the standard DOS entry points and do not do tricks with the disk run without modification. Others do not. One of the more annoying problems is that commercial and public domain disk zap and catalog programs do not run with the Vista. Given the number of files that can be put on a single disk, a catalog program is important and a program to alphabetize the catalog is critical. I have successfully modified MAS.CAT to work with the V1200 and have cobbled together working programs to alphabetize the directory and serve as a moderately good disk zap. But the process is not easy, and it is made harder because Vista's manual provides absolutely no information about the modifications made to DOS or even the location of the catalog on Vista disks. (The catalog starts at track 17, sector 29, continues through sector 4 and then goes onto the whole of track 18. Track 17, sectors 0 through 3, contains the VTOC.) At the moment, the only commercial programs I have found that are compatible with the V1200 are The Spreadsheet, Magic Window II and The Accountant.

Backup, with disks as large as these, is also a problem. One disk can be copied onto another. And the copy can be removed from the cartridge and stored separately. However, the process is slow because VFID requires frequent accesses of each disk, and the picker requires two to ten seconds for each change. Backing up a full disk requires half an hour to an hour; and at least once when I tried backing up a disk, the operation failed halfway through.

Alternatively, one can back up a disk onto regular disks, as long as no individual file exceeds the normal capacity. Since this operation re-

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quires no Vista disk changes, it is relatively speedy, especially with Quickcharge in operation. However, if the Vista disk is full, you must manually change about ten regular disks over about a 20-minute period. A better idea is selective backup onto floppies. I have written an Exec file that runs the modified FID and automatically backs up all my Accountant files to a regular floppy in about a minute. A really good disk copy program (perhaps writing onto a scratch regular disk to minimize changes of the Vista disks) is sorely needed.

As mentioned, the Vista's modifications to DOS are undocumented. The INIT command is disabled. Regular disks must be initialized with a standard DOS up; Vista disks are initialized with a Format program provided by Vista. Unfortunately, given the capacity of these drives,

Vista does not fix the notorious Append bug, which prevents use of Append for files more than 256 sectors long. Fortunately, however, the fixes (published in *Call-A.P.P.L.E.'s* book *All About DOS*) are compatible with Vista DOS and can be added by the user. Most other DOS patches overwrite part of Vista's code and cannot be used. I did, however, manage to find space for a patch to terminate the catalog scrolling on control-Q. This is a very useful function for drives that can accommodate up to 14 screens full of files.

The V1200 comes with Quickcharge, a DOS speedup utility that works only with the Vista DOS. With Quickcharge in operation, LOAD and BLOAD are significantly speeded up. The speed increase varies somewhat with the location of the files on the disk. SAVE and BSAVE are also speeded up, though not as much. Here the

speedup is greater if the file is not already on the disk. In general, it is roughly comparable to the improvement obtained with, say, DiversiDOS. On text file manipulation there is a small improvement. A program to write 1000 40-byte records to disk took about three minutes with normal DOS, two minutes with the Vista and under a minute with DiversiDOS.

CP/M

As mentioned, the V1200 is compatible with some but not all CP/M cards. I tested it with the Microsoft card and found no problems. I have been running it with the PCPI AppliCard for about a month and found a few problems.

With either card, the Vista can be installed so that its drives are A: through E: or C: through G:. For most purposes, I find it more conve-

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nient to have the regular Apple drive as the boot disk, since CP/M accesses it so often. I prefer to avoid switching among the Vista disks whenever possible.

In general, the V1200 works superbly under CP/M; and most of the compatibility problems under DOS evaporate here, where most software is not copy protected and can be moved to the V1200 at will. I have run dBase II and FinalWord regularly with the V1200 and both work beautifully. All of the public domain software I have tried (mostly from the CPMSIG's disks) have run perfectly as well.

I have, however, had problems with two programs: WordStar (and its associated SpellStar and Mail-Merge) and Magic Wand (an early version of PeachText). Although I was able to get both programs to load and edit properly, I have not yet been able to get either to function when a disk write is necessary. Since that means that files can be edited but not saved, the problem is critical. It appears to relate to the drivers that Vista provides for the PCPI AppliCard. Since both programs function properly with the AppliCard, it may be that I have made some mistakes in the PCPI installation program or there may be a bug in Vista's drivers. To date, calls to PCPI and Vista have produced sympathy but no solution.

Pascal

I have done very little with the V1200 under Pascal, except to verify that it operates and to run a few programs. With the Vista as the root volume, compilation time is speeded up somewhat. The present software is in the process of being rewritten; Vista promises a free upgrade when the new version is ready. At the moment, there is one serious problem that can be worked around: on a warm boot, all workfiles are lost. If you save your workfiles before assembling or compiling them, the inconvenience is minor; if not, and the system bombs, you're out of luck.

Summary

The V1200 is a promising entry in

the high-storage disk sweepstakes. At approximately the same price as a single 8-inch drive, it provides five times the on-line storage. At less than most hard disk drives, it provides as much on-line storage and is easier to backup, although it is slower in operation. As compared with two high-capacity drives—for example, two Rana Elite III's or two 8-inch drives—the comparison is closer: having two such devices on-line at the same time makes backup of disks *considerably* faster. Here the choice would seem to depend a good deal on one's preferences regarding disk switching and even the size of the device.

As with all such devices, compatibility problems are severe with commercial programs designed to run under Apple DOS; they are minimal with CP/M and Pascal. Whether the forthcoming Pro-DOS will make things better or worse is an open question. However, at least one program (General Manager) is being revised to work with the V1200, and one can expect that others will be made compatible as well, particularly since such revisions are likely to make the program work with many 8-inch drives. As time goes by, one can expect at least some public-domain (and possibly commercial) utilities to support the product.

Finally, service and support can be a problem; it may be a greater problem with the Vista, since the disk picker adds an additional mechanical component that is subject to failure. Vista's telephone support is quite good. I have not had occasion to test their service.

All in all, the V1200 is worth serious consideration by anyone whose storage needs exceed that of two ordinary Apple drives. It is a substantial aid, even under DOS; an enormous number of utilities can be used at a moment's notice. Under CP/M, it allows full use of programs that cannot otherwise be completely utilized. And it provides a happy medium between ordinary disk drives and expensive (and picky) hard disks. ■

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Software Reviews

ThinkTank

Here is a program that not only performs most traditional word processing tasks, but also provides unique capabilities for assisting the creative process. Called ThinkTank, "the first idea processor," this offering in Pascal from Living Videotext of Palo Alto, CA, is available for the Apple II Plus, IIe, and III for \$150. All versions require two or more disk drives. I tested the Apple III version, which came with a boot disk, a program disk and a disk containing a sample outline. All disks are copyable, so making a backup copy of the software is easy. I appreciate the authors' confidence in the user's moral integrity, and I hope other software houses follow this practice.

ThinkTank is based on the premise that humans naturally organize thoughts into outline format. The program permits the user to first structure an outline of what is to be reported, and then to go back and flesh out the details. While this much can be done with almost any word processor, ThinkTank users can "collapse" the finished report, showing only the key headings. The overall direction and structure of the report can be examined without getting confused by the detail. An individual heading can be expanded to show all the levels of detail that are subordinate to it. Headings, along with their

associated subheadings and detail, can be copied or moved to any new location in the outline.

ThinkTank is a versatile word processor. It will work in conjunction with most Pascal-based word processors, although I can't imagine that users of ThinkTank would ever find many occasions where another word processor would be necessary. Text can be readily entered under any outline heading. The text entry mode has automatic wraparound and permits full screen editing. Editing functions such as deletion, insertion, block copy and move, find and replace are supported. If ThinkTank only had a spelling checker, I would probably never need to use my other word processing program, Word Juggler.

For people who aren't content with the various command keystroke sequences provided with ThinkTank, command codes may be reassigned to other keys. After living with ThinkTank for a month now, I cannot see any sequences that I would like to change, but it's nice to know I can if I want. Living Videotext, Inc. has made available a series of technical notes that describe in detail the installation of ThinkTank on a hard disk system, the use of ThinkTank with word processors, and the creation of Pascal software that will interchange information with ThinkTank. Each technical note costs \$5.00.

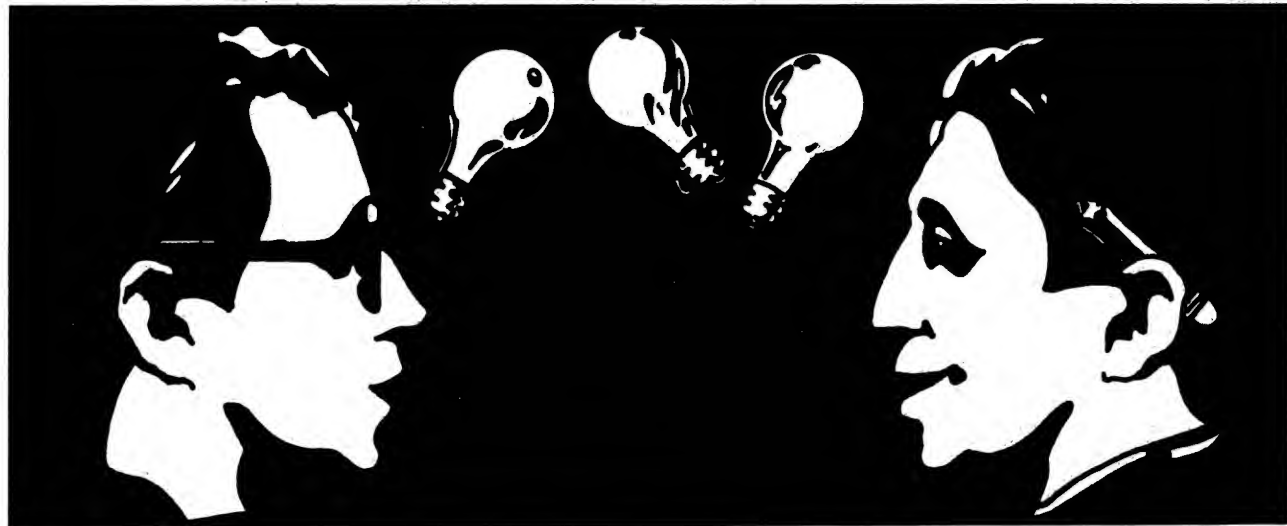
ThinkTank is fast enough that I

never felt that the program was slowing me down. The process of entering the headings for an outline took little time. The processes of saving a paragraph to disk and of searching for keywords involved delay as the machine accessed the stored text on disk. The delay is minimal, certainly no worse than experienced with WordStar.

ThinkTank requires that the user provide one disk for each outline. This sounds wasteful at first, but in actual use several reports could be lumped together under one overall outline. For example, I am writing this review using ThinkTank with a main outline containing several software and equipment reviews.

After the outline is fleshed out, the user can utilize the flexible reporting features of ThinkTank to generate printed copy. Format options are available to permit control of the report's appearance. If desired, the outline headings will be printed with subordinate text and subheadings appropriately indented. Numbering of the sections is optional. If the numbering option is selected, the main sections are numbered in whole numbers with subheadings given decimal notation, i.e., under heading 5 there might be a subheading 5.2, which in turn could have further subheadings 5.2.1 and 5.2.2. ThinkTank also will allow paragraphs to be printed one after another as in this review.

A feature unique to ThinkTank fa-



cilitates the creation of tables of contents. When a report is printed, ThinkTank keeps track of the page numbers on which the outline headings and subheadings will be printed. A recap is then printed, showing each outline heading followed by leaders and the page numbers. The result is an attractive table of contents with both margins justified.

One of the hallmarks of well-written programs is the anticipation of user mistakes and the provision of meaningful error messages. ThinkTank scores high marks in both error trapping and messages. I tend to make quite a few mistakes, yet I never have caused this program to hang or do anything that wasn't fully explained by a message at the bottom of the screen. Before changes are thrown out, ThinkTank always asks for confirmation.

ThinkTank comes with a 228-page manual in a spiral binder that stays open at the page desired. A brief introduction, in which concepts and equipment configuration are discussed, precedes an overview of ThinkTank. A thorough tutorial follows. Both the overview and tutorial sections are designed to be read while running the program. An 84-page reference guide to all the ThinkTank commands is included, along with a complete section explaining the error messages, an index and a reference card summarizing all commands. The documentation is well-printed

on quality stock. All photos of screen images are clear. The manual has been proofread well: I found only one grammatical error in the whole book. Since the same manual is provided with all Apple versions, some sections must be skipped depending on which version is being used.

ThinkTank proved to be easy to learn. Working through the tutorial took about two hours. The program's use of command menus made it easy for me to resume work after a two-week hiatus without having to relearn the command structure.

Other word processing programs like Word Juggler may be easier to teach to non-technical personnel such as secretaries who have to do straight typing. Word Juggler contains all text being processed in the machine's memory and is faster on search and replace tasks than a disk-based program like ThinkTank. However, for people involved in the creation of reports from scratch, ThinkTank's unique outline-based system should prove a very powerful addition to their software toolkits. ■

Justin Crom
Littleton, CO

Lancaster

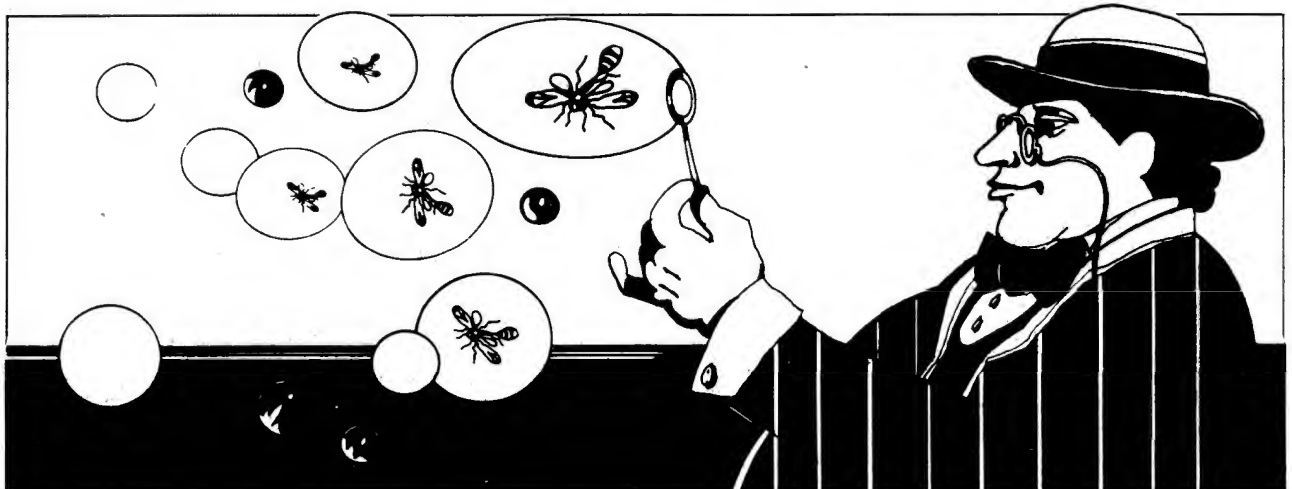
Grab your pressure suit and laser guns, fuel up and board your spaceship. The Earth is threatened

again, this time by strange bubble-blowing space bugs. In Lancaster, you must destroy the bugs and bubbles before they destroy the Earth or you. Minimal contact between you and a bug or bubble destroys your ship and starts another round of the game, costing you one ship for your carelessness.

The game begins with four spaceships in reserve and one active on the playing area. Three of the troublesome bugs float at the top of the screen, moving randomly and blowing their fatal bubbles. These bubbles contain larvae for reproducing more deadly bugs. To progress to a new level of play, you must shoot all the bugs before they can release their bubbles.

The bottom of the screen shows your remaining ships and the current game score. Just above this line is a row of colored bars. As each bubble is released by a bug, it falls toward the bottom of the screen. Like giant rubber balls, the bubbles bounce when they strike the side of the screen or the colored bars. Each bounce has less force than the previous one, and the bubbles finally come to rest at the bottom of the screen.

If a bubble lands with enough force on a bar of the same color, the bar disappears and you win extra points. By holding down the firing button, you can make this row of bars move across the screen with your ship, increasing the chances that a



bubble will find its corresponding color.

Your ship has a set of pincers so you can pick up a bubble which has come to rest and drop it again. This allows you to attempt more bonus points for hitting the proper color bars. But be careful—if the bubble bursts and releases larvae while you are carrying it, you will probably lose your ship. If you can catch a bubble before it stops bouncing, you get extra points. If you miss, your ship will probably be destroyed by contact with the bubble. Save this feature until you are very adept at simply avoiding the obstacles.

Shooting the bubbles will not destroy them, but will produce one of two effects. The first few times you hit a bubble, it will be pushed higher toward the top of the screen. This causes it to strike the colored bars with more force when it falls, earn-

ing you more points if it strikes the proper colored bar. If you persist in shooting a bubble it will burst, releasing the insect larvae (which are immune to your laser). These larvae soon grow into more bugs to blow more bubbles.

If the situation becomes impossible, you can deploy a smart-bomb. This will destroy everything on the screen except your ship and any larvae which have hatched but have not yet become fully grown bugs. You have three smart-bombs to last the whole game.

At the end of each game a high-score display is given, with the opportunity to record your initials and score. Lancaster offers six levels of play. Keyboard or joystick play is allowed. A 48K Apple II, one disk drive, and a color monitor or television are required.

Lancaster is produced by Silicon

Valley Systems, 1625 El Camino Real, Belmont, CA 94002. Priced at \$29.95, this game should be a welcome addition to your game collection. ■

Richard Brown
Oakland, CA

Micro-Math

Hayden Software offers four basic math packages for the 4-to-10 age group—Microaddition, Subtraction, Multiplication and Division. Each package is sold separately, and each offers the same four options.

Option 1 is basic and deals with number values. The child selects a number (one to nine), and depending on the package, he or she sees that number of apples (addition), birds (subtraction), bunnies (for multiplica-

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IC-11

tion—what else!) and fish (division).

Option 2 continues a number-value theme. The child counts the fruit or critters displayed and enters the results. If the answer is correct, the computer plays a happy tune. If the answer is incorrect, a sad tune is played. After two tries the correct answer is displayed.

Option 3 begins mathematical calculation. The problems begin simply. The children who went on to this option in my field trials moved along quickly with the sequential presentation.

Option 4 presents two choices: a Quiz or a Calculator mode. The quiz is suited for the child who has had instruction in math skills. When the child gives a correct answer to a problem, the computations are shown. The problems become more difficult quickly, since they are aimed at a more sophisticated student than

are the first two options.

The second half of Option 4 provides a calculator—limited to the type of computation (addition, multiplication, etc.) covered by the package. The presentation is clever, but a child could use an inexpensive calculator to much better advantage.

Hayden's four math packages are colorfully presented, and the graphics are adequate. But Options 1 and 2 (number concepts) should not be repeated in all four packages. A better idea would be to include them in only one, leaving more room for problem solving in the others. All four packages have to be purchased to make any kind of educational sense.

Hayden Software is located at 600 Suffolk St., Lowell, MA 01853. Price is \$29.95. ■

Bonnie Fox
Merrimack, NH

Pen-Pal

If you need a low-cost word processor for basic letter writing, you should give Pen-Pal a serious examination. However, if you will be doing a wide variety of word processing tasks, you may need to spend a bit more money.

Pen-Pal is fairly easy to learn because it does not have a multitude of special control functions. On the other hand, many of those special functions can be handy. While Pen-Pal has all the basic operations, the control keys for editing are not well-placed. Scroll left is CONTROL-Q, scroll right is CONTROL-E, scroll up is CONTROL-W and scroll down is CONTROL-X.

Pen-Pal uses horizontal scrolling. You have 80 columns to work with, but you can see a window of only 40

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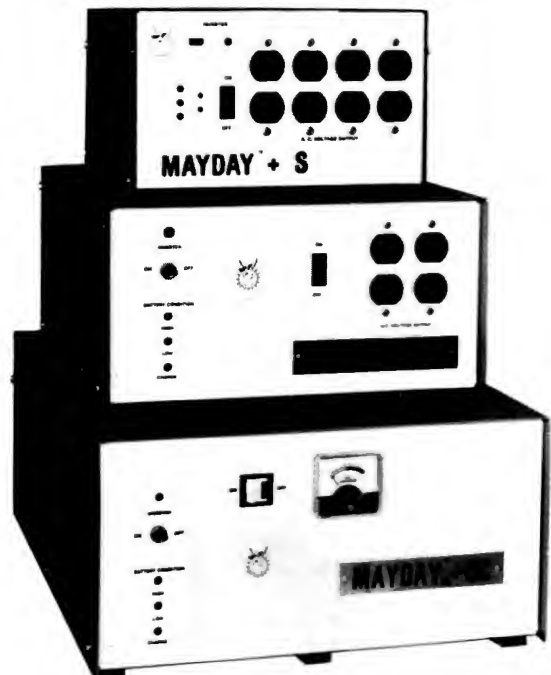
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Software Reviews

of them at any time. You can scroll the window left or right one character at a time, or you can jump 27 characters either way. "Why 27?" you may ask. I don't know, but the result is that you cannot go neatly from the left side to the right side. I found myself giving the scroll command and wondering what had happened to the first or last couple of characters in the line. They were there, of course; I just had to scroll farther to see them.

You can easily switch from the Entry/Edit mode to the formatted Display mode for viewing the text as it appears in print. However, after editing or entering new text, you must enter a J command (for justify and paginate) to properly format the file for viewing or printing.

A word processing program usually provides special embedded commands which result in useful formatting at print time. Pen-Pal allows for only a few such commands: new page, titling, line spacing, left and right margins, enable/disable right justification and line centering.

You can accomplish other formatting characteristics by sending special control sequences to your printer. Pen-Pal permits up to four such sequences to be defined and embedded within your text. The configuration system can be used to establish common formatting standards such as top and bottom margins, horizontal text width, and the need for nulls to be sent to slow printers.

Pen-Pal's documentation consists of a 71-page manual and three reference cards. The manual begins with a tutorial which includes enough examples to get a user started on a letter. It then moves on to a configuration system and ends with a reference section on all control keys and commands. Two of the reference cards contain keyboard layouts for the Apple II and IIe and one contains a summary of all control keys and commands.

Authors of word processors will often provide on-screen documentation which can vary in detail as the user becomes familiar with the program. In the beginning, a lot of detail is

needed. As the user gains expertise, he should be able to reduce the amount of help offered. Pen-Pal provides five very helpful option screens which the user can instantly call up. Unfortunately, the screens are available only when the program is configured for a 48K system. When the program is configured to operate using an extra 16K RAM card (an option that expands the allowable text from 22K to 33K characters), the menus are no longer available.

Unlike many word-processing programs for the Apple, Pen-Pal can read and write both binary and text files. Pen-Pal has the ability to load or save files directly to modem, an interesting option which I have not tried. What is unclear to me is how the connection will be made in the first place since there is no dialog option for dialing up or logging onto another system. Pen-Pal allows the user with a lowercase adapter chip to see lowercase on the screen. The program can utilize your joystick as a mouse for moving the cursor on the screen. Important features not handled by Pen-Pal which many users may need include footnoting, index construction, and form-letter writing.

Pen-Pal requires an Apple II with 48K RAM, one disk drive, DOS 3.3 and a printer. Price is \$59.95. Contact Howard W. Sams and Company, 4300 West 62nd St., Indianapolis, IN 46202 for more information. ■

David Morganstein
Germantown, MD

Tycoon

The object of Tycoon, a commodity market simulation game, is to make a million dollars by speculating in commodity futures. One session of the game consists of 52 weeks; each week you review price changes from the previous week, perform research, then buy or sell commodities in the futures markets.

Tycoon is a complete economic simulation of the commodity markets. News headlines from financial

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publications are included as well as graphs for price trend analysis. Tycoon has a built-in program generator that allows you to create an unlimited amount of economic climates.

You begin playing Tycoon as a Novice, with \$10,000 to invest. As your net worth rises, your status changes, and you are allowed more investment alternatives.

When your net worth reaches \$15,000, you become an Investor, and you can trade four additional commodities. You become a Speculator at \$30,000, and you are able to sell short. A short position lets you make a profit on a price decrease and gives you a chance to capitalize on up or down trends. Other status levels and net worths are: Professional (\$90,000), Broker (\$250,000) and Tycoon (\$1,000,000).

Once you've achieved a certain status, it will not be reduced if your

net worth drops below the minimum requirement. Also, Tycoon lets you advance only one status level per week.

Should you have losses that leave you unable to buy one contract, you will be declared bankrupt. Your status then is reduced to Novice, and you're given \$5,000 to start again. Once you reach Tycoon status, you are given \$50,000 to try for another million.

At the start of each game, Tycoon creates a new commodity market environment, consisting of 52 weeks of commodity price changes. You start out in the second week of January. At the end of the 52nd week, your holdings are converted into cash, and that amount, along with your status, is saved. You can start a new 52-week session, using your previous cash balance and status and then keep trying to become a Tycoon.

Tycoon can store the game status

of up to 14 players. An entire game session can be saved to disk if you wish to stop before the 52nd week; the abbreviated game can be continued at a later time. Only one game can be saved per disk. Any new game saved erases the previous one.

Each commodity traded has a specific margin requirement. The margin is the deposit you must put down to purchase a futures contract. Tycoon expresses margin as a percentage. The commodities that a Novice can trade require a ten percent margin. As your status increases, you are able to trade commodities with smaller margin requirements. This greatly increases your leverage.

Tycoon uses abbreviations for each commodity you are buying or selling. They are different from actual commodity symbols but are easier to remember for the player new to the world of commodities.

The Tycoon disk has a ten minute

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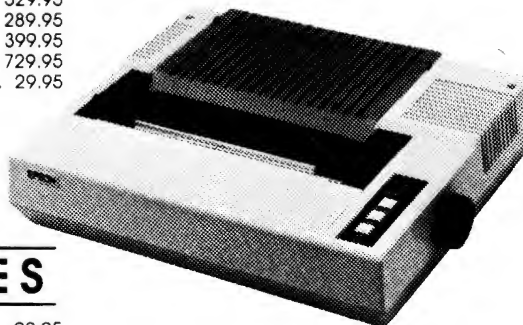
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demonstration to familiarize you with the game. There is also an unfinished game saved to disk by a player named Cheat. The "player" in this demonstration game has Broker status and \$250,000 net worth.

Once you boot Tycoon, a commodity index graph appears. This gives you an overview of the general direction of commodity prices. Then you encounter News Reports—financial headlines that can signify future price movements if interpreted correctly. All commodity price changes in Tycoon are tied to this fundamental data. The next step is the Weekly Price Changes report. This shows detailed commodity price information and changes from the previous week.

After pressing return, you are in the Menu Selection mode. From here you can research, buy and sell commodities. Your current status and net

worth are also shown at the top of the screen. Five types of graphs for any commodity can be plotted; they are an important research tool. These can show price trends or seasonal factors that affect prices.

After you have read the news, graphs and price changes from the previous week and either bought, sold or done nothing, you can move on to the next week. This starts the above procedure over again. Remember, you have 52 weeks per session. The manual advises you to wait a few weeks before making your first investment; this allows you to get a feel for the price trends.

The Menu Selection mode also lets you display your portfolio holdings, get commodity descriptions and display the current prices.

Hitting E in the command mode ends or saves a game. A partial game is saved with the existing market en-

vironment. This is a great help because it takes up to eight minutes to load a new environment. If you end a session without saving it, or if you reach the 52nd week, you will get an end of game report.

A player directory (maximum 14) with every player's name, last score and status is kept. Both sides of the game disk are used for saving games and keeping the player directory. No additional blank disks are needed.

Tycoon is a realistic commodity market simulation that involves the same criteria used in real futures trading. With a different market environment created for each new game, it always remains challenging.

Tycoon is manufactured by Blue Chip Software, 6744 Eton Avenue, Canoga Park, CA 91303. Price is \$59.95. ■

**Richard Fuccillo
Groton, MA**

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6. AL prints last loaded program Address & Length in decimal & hex.
7. HIDOS moves DOS to Language Card & continues operation of program.
8. / is a one keystroke Catalog in addition to the original command.
9. DATE prints with any clock. Also File Dating with clock or manual.
10. FIND prints address's of hex found in 64K memory. Hidios cmd only.

Compatible

All DOS entry addresses have been preserved. DOS is original length and compatible with most software. David-Dos II is copyable and creates fully copyable updated disks. DAVID-DOS II is licensed by programmers for inclusion in the software they sell. Init areas were used for David-Dos II. Works with all Apple IIs including Iie80 Col, Franklin & Hard Disks, such as Corvus & Xebec. Requires 48K. Complete documentation for screen or printing and many utilities are on the disk.

All times in seconds. (Time Test programs available)		DAVID DOS-II	ProDOS	DIVERSI DOS	DOS 3.3
TEXTFILES (100 Sectors) (791 Strings, 32 chars ea) (442 Sectors, 7 x 500)	TSAVE	8.0	NO	NO	NO
	TLOAD	6.2	NO	NO	NO
	WRITE	29.3	28.0	29.4	88.4
	READ	24.3	16.3	24.3	83.8
	PRINT/READ	44.2	45.9	45.1	117.1
	APPEND	142.3	142.9	151.1	1231.2
APPLESOFT (100 Sectors)	*SAVE	7.1	16.4	6.4	33.1
	LOAD	5.0	4.0	5.0	23.5
INTEGER (100 Sectors)	*SAVE	7.3	NO	6.6	33.4
	LOAD	4.9	NO	4.9	23.4
BINARY (100 Sectors)	*BSAVE	7.8	18.4	7.3	28.7
	BLOAD	5.8	4.8	5.8	24.5
48K PROGRAM SPACE (With 3 Bufs avail)	APPLESOFT	36,352	NO	36,352	36,352
	INTEGER	36,352	NO	36,352	36,352
	BINARY	36,352	34,816	36,352	36,352
64K PROGRAM SPACE (With 5 Bufs avail)	APPLESOFT	46,592	31,232	45,658	35,162
	INTEGER	46,592	NO	35,162	35,162
	BINARY	46,592	40,704	45,658	35,162
NUMBER OF DOS COMMANDS		37	29	31	28
CLOCK FILE DATING		YES	YES	NO	NO
MANUAL FILE DATING		YES	NO	NO	NO
ONE KEYSTROKE CATALOG		YES	NO	YES	NO
AUTO USE INTEGER CARD ANY SLOT		YES	NO	NO	NO

Each Program was tested twice W/Apple Clock Card on a newly formatted disk containing DOS.
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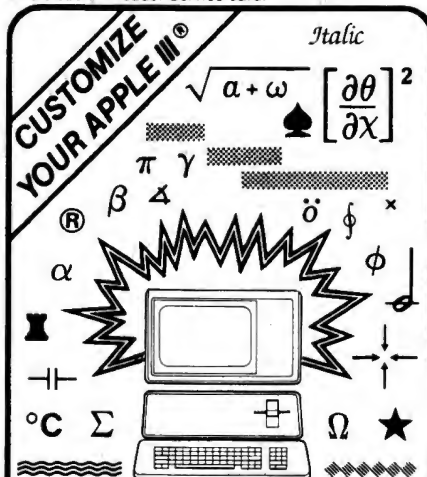
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Death in the Caribbean

If you have been saving your dimes, nickels and pennies for a dream vacation in the beautiful Caribbean, just keep on saving. Death in the Caribbean is no vacation. The only sparkling expanses of sandy beach you'll see is the sand under which you may be buried. Death in the Caribbean is a delightful new hi-res adventure game for the Apple. Instead of lounging in the sun consuming local beverages you will find yourself pitting your mind and efforts against an island possessed. One wrong step and the adventure is over

**"...blundering into Voodoo
Cave may be more than you
care to deal with."**

for this round. The right steps will lead you to the reward of buried treasure.

The game opens on the southeast corner of a lost tropical nightmare. Armed with only a sketchy map and your innate skill for exploring new ground and solving contrived and tricky puzzles, you set off to meet your fate. As you wander, getting the lay of the land, you soon realize your map is woefully inadequate. There are paths to be taken which are not indicated and paths shown which cannot be traversed. Then you meet your first deadly peril, also not shown. Well, the map is a nice touch, but if you're serious about finding the treasure and getting out of this alive, I recommend bringing along a pen or pencil and either updating the included map or (as was my preference) starting over from scratch and creating your own more accurate version.

After a bit of exploration it becomes apparent that only half the island is accessible to you. Trying to get to the other half always runs into

dead ends. Explore as you will, your frustration slowly increases each time you discover that one item which will surely get you across the river—only it isn't the one you need. No, this isn't a vacation, it's brain-beating work.

A pesky little ghost also keeps appearing and disappearing. The first few times you see him he seems benign enough, flitting through the air, smiling down at you. Then he says, "I hid your..." Sure enough, when you take an inventory of your possessions, the item named is missing. If you're lucky, it's only one thing. Sometimes he hides everything. Fortunately, he's not very clever. He always hides whatever he's taken in the same place. Once you have discovered his place it's easy enough to retrieve whatever has been taken, though it usually means a trek across the island to his hiding spot just to get your possessions back. Had he not been a ghost already, I would have been happy any number of times to help him achieve that spectral status. It may have only been the random perversity of the pseudo-random number generator, but it seemed that he knew the item to take which would cause me the most frustration.

Very soon (or very much later, depending on your skill) the path to the other side of the island will reveal itself. It's at about this time that the southern side of the island, with which you have become very familiar, begins to look downright friendly. Finding the other side of this "Devil's Island" and blundering into Voodoo Cave may be more than you care to deal with.

The graphics in Death in the Caribbean are of the usual standard for this genre of adventure game. They are adequate but will not knock your socks off. The sentence parser, on the other hand, is very limited. After numerous journeys across the southern portion of the island (trying various approaches to attain the northern side) I began to wish the game had the ability to understand compound commands. It was necessary to enter each individual command sequence as a separate directive.



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As an example, and without giving away any of the challenges involved, the matter of tying a rope to a tree must be done as two separate commands. If you enter, "Tie rope to tree," the game responds with, "Tie rope to what." Should you be frustrated with its simple-mindedness and respond, "To the tree, dummy," you will completely confuse the poor moron. You then must start over from the beginning and re-establish the fact that you are trying to tie the rope. Admittedly, this is a minor complaint, and the only real one I have about this exciting game. With the sophisticated sentence parsers currently being used in games of this type, it does make playing more of an effort than should be necessary.

Your game may be saved during any point of play using a standard, DOS 3.3, formatted disk, and up to

**"Admittedly, this is a minor
complaint, and the only
real one I have..."**

nine game variations may be saved. The original disk is covered by a 30-day warranty and a registration card is included in the package. The registration card must be mailed back to Micro Fun (at your expense) before you can expect any help should you have problems with the game. After the warranty period a blown disk will be replaced for a \$5.00 charge and the return of the original.

Death in the Caribbean should provide you with many hours of edge-of-your-seat excitement and will be a welcome addition to any game collection. The program is produced by Micro Fun, 2699 Skokie Valley Road, Highland Park, IL 60053. Price is \$35.00. ■

**Richard Brown
Oakland, CA**

Pentapus

The challenge of this game is to defeat the Pentapus, a dreaded monster with five tentacles who shoots out elusive Whirrs and dangerous bombs. Your weapon is a Stargate, a window on the Pentapus' world that is vulnerable to the smaller bombs propelled by waves of Drangels, C-Aliens, Eagulls, and Nagas but is also able to destroy all of these menacing creatures, including the Pentapus.

With continuous action and a constant background of arcade sound, you maneuver your Stargate over the moving villains and destroy them when they touch your window with a press of the button. Be careful, though, because your shield can gradually be destroyed by enemy bombs. Also, stay clear of the threatening thunder cloud. At any moment, it may shoot lightning and destroy or weaken your gate.

The first wave consists of Drangels only; then come the C-Aliens, Eagulls, and Nagas.

Finally, you confront the Pentapus himself. He sends out three Whirrs and a rain of small bombs and smart bombs. Elude them all—it helps to press button 1 and reduce the size of your gate. When the Whirrs are gone, you at last have a chance at the big fellow himself—if you can get him right between his nasty eyes!

When the Pentapus is gone, level 2 begins. It has five levels, but those simple Drangels turn into Nagas, and the Whirrs shoot more smart bombs. Survive level 2 and level 3, and you're home free.

With each screen, your energy level is renewed. Clearing all the little creatures away earns you an extra point bonus. The more shots you take, the more energy you use up. Run out of energy and you lose the Stargate.

The animation is excellent—all of the various creatures have their own motions, and the tactics are simple to learn. It looks great in color, but a monochrome green monitor in no way inhibits the action. A joystick is



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essential.

The sound is continuous, though it may be silenced. During all levels there is a steady tick, which becomes louder as you approach the end of your available energy. Each enemy killed has its own sound effect, especially the Pentapus himself.

There are four levels of difficulty provided for Pentapus, labelled K, 1, 2 and 3. The K is for kids, not kindergarten; it is a level that my three-year-old has fun playing. The game in level K is slow, and the energy bonus is not awarded. Even at that level, however, only one family member has yet overcome the second level Pentapus—and we've all been trying.

The top ten scores are saved, and should you reach a score within that range, you may record it with your initials. These scores may be cleared from memory and new scores saved

temporarily without losing those stored on the disk.

This is indeed a game for all levels, and one that has broad appeal. Pentapus, by Jeremy Sagan, is available from Turning Point Software, 11A Main St., Watertown, MA 02172. Price is \$29.95. ■

Tobi Hoffman
Ashland, MA

Stellar 7

You're at the controls of The Raven, the ultimate combat vehicle, a tank equipped with an invisibility shield, a device to detect your enemies before they see you, and the ultimate tank weapon, a biphasal thunder cannon.

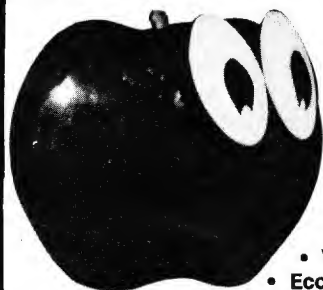
Your mission is almost childishly

simple, really. All you have to do is take The Raven to seven implacably hostile worlds, destroy everything that moves and then kill the emperor of the galaxy, Gir Draxon.

That's the scenario of Stellar 7, a shoot-em-up arcade game by Damon Slye for Software Entertainment Co. Coin-op videogame players will recognize some similarities between Stellar 7 and a coin game called Battle Zone. These similarities include very unusual black-and-white high-resolution graphics which only outline the objects in your view screen. These items include tanks, cubical obstacles, artillery and floating thermonuclear mines...all completely transparent. In both games, the idea is to maneuver your tank until a target is in the crosshairs and then to blast that target out of existence.

Where the two games diverge

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*Paper Tiger is a trademark of Integral Data Systems, Inc.

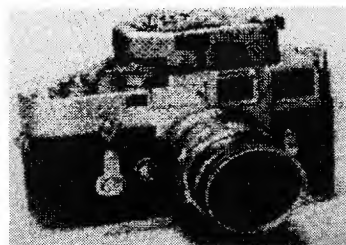
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sharply is in sophistication and quality, with Stellar 7 being a much more challenging, complicated and satisfying game by far than Atari's coin-op machine version.

As play begins you are offered the option of seeing a briefing on the types of tanks and other weapons you'll be encountering in your quest against Gir Draxon. A graphic displays the vehicle and then turns it 360 degrees so you can familiarize yourself with it thoroughly. Beneath appears a text window with a description of the weapon, including its firepower, speed and armor.

Having absorbed the briefing, the Warplink plunks you down on an icy planet, the first of seven worlds on which you must fight in order to overthrow Draxon. On the video screen you'll see a high-res graphic depicting your surroundings. Above the graphic are displays showing

your current score and a gravitic scope which shows your position in relation to the immovable objects and very mobile weapons which quickly surround you. To the right of the viewscreen are scales which show the amount of protonic shielding you have left and your energy level. Run out of either and the game ends.

You have the choice of using a keyboard, joystick or Atari-type joystick to control the movement of The Raven. You can move forward or backward, as well as forward or backward right or left. In addition, you can stop and simply rotate in place. Hitting the spacebar or joystick fire button fires the thunder cannon. Hitting the Z key turns a zoom lens on or off (don't get confused between views—it's harder to hit a target with the zoom on).

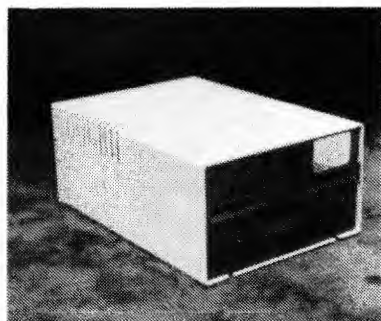
One final option which may prove to be very helpful to you indeed is the

invisibility cloak, which makes you disappear. You'll still be able to maneuver The Raven, sight enemies and shoot at them (although shooting gives away your position, so keep moving!) but only at a penalty of energy. Switch on the cloak too many times and you'll knock yourself out of the game.

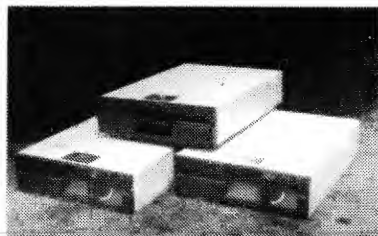
The best strategy I've hit upon so far is to get the tank going as soon as it clears the Warplink and to zig and zag like crazy. The enemy weapons cannot train on you as fast as you can aim at them, so if you're constantly changing course, it makes it all that much more difficult for them to hit you. Get the idea? Another helpful hint is to glance at the gravitic scope from time to time, the way you'd keep your eye on a rear view mirror, and allow it to warn you when the bad guys are coming too close so you can effect a course change in good

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time.

Is this game fun? Yes! The variety of enemies, the challenge of figuring out the best ways to avoid and destroy the various types of weapons and the sheer joy of speeding along in a tank and shooting at everything you see will keep you coming back again and again for another play.

Stellar 7 is available from the manufacturer, Software Entertainment Company, 537 Willamette, Eugene, OR 97401. The list price is \$34.95. You'll need an Apple II, II Plus or IIe and a disk drive. Options include a joystick or Atari-style joystick (with Apple adaptor). ■

Brian J. Murphy
Fairfield, CT

Lode Runner

The Bungeling Empire is up to its old tricks. For those familiar with the antiheros of Star Blazer and Choplifter, the same leaders have once again returned to wreak havoc upon your sanity and gaming skills. This time, however, the name of the game is Lode Runner, another fine addition to Broderbund's stable of arcade games.

This latest entry presents 150 treasury rooms, each one stocked with Bungeling guards who try to prevent you from recovering stolen treasure chests. A variety of chests, laden with treasure, are found in each room. An assortment of ladders, brick and aluminum pathways, and mysterious chambers hinder you from the guards. Learning how to use these impediments is part of the challenge of Lode Runner.

Doug Smith, the game's creator, has generously provided you with fleet feet. This enables you to outrun the guards, but you are constantly outnumbered by the Bungeling Baddies. Should you manage to attain the higher levels, the guards increase in number. You are not unarmed, however. A laser pistol lets you blast pits into certain sections of the brick floors, and guards sometimes tumble into them. After a guard has fallen,

**"Make each screen as easy
or difficult as you like. You
become a game designer
with hardly any
effort at all."**

you can run across him and continue on your quest.

Should the hole you've blasted close in around the trapped guard, he is gone forever. Unfortunately, a replacement pops up at the top of the screen. If the replacement Bungeling has a maze of ladders and passageways to traverse before reaching you, there is time enough to acquire a hard-to-reach treasure chest.

The following example shows how treasure chests can be acquired. You find yourself on a lengthy stretch of flooring near the bottom of the screen hotly pursued by four Bungeling guards. The treasure you need to advance to the next level is behind the enemy. By blasting six adjoining holes in the floor, you entice continued pursuit by remaining stationary near the last hole. The guards tumble into the holes, running over one another. Patience finds the Bungelings becoming one with the floor which fills back in. You may now run to the treasure without fear of annihilation and grab it before the reinforcements from the top of the screen arrive.

But don't fall into a single hole—there's no way out. A press of control-A eliminates your commando and allows play to continue with one player. The way to the next level is revealed after you acquire the final treasure for a particular screen. One of the ladders suddenly exhibits an extension of rungs that lead to the top of the screen. All your commando has to do is climb the ladder to the top. The next level is exhibited on screen. There are 150 of them!

You aren't the only character with a penchant for carrying around treasure. The Bungeling guards themselves are adept at picking up treasure chests and running around the

screen with the booty. You can't tell a gold-carrying Bungeling from one merely supporting his or herself.

You are given time to study each level as it appears on screen. Play can even be halted at any time to give you a breather. Keyboard or joystick control manipulates your commando about the screen. Each completed level earns you 1500 points, while a gold chest adds 250 points to your score. Trapping or killing a Bungeling guard in a hole is worth 75 points. High scores are saved to the game disk with the player's initials as a proud reminder of the finest attained totals for running, jumping, climbing and puzzle-solving skills.

If Lode Runner had no further capabilities other than to entertain, it would be worth the price. But there is also a game generator included! Make your own Lode Runner game with as many levels as you wish. Make each screen as easy or difficult as you like. You become a game designer with hardly any effort at all.

Levels may be edited after they're constructed, which is handy when you realize a specific floor doesn't give the commando any way out to the next screen. Games are created on a separate disk which is initialized by the Lode Runner game disk. Shapes are placed wherever you want them on the screen through easy key-presses. Once the constructed game is completed, you have a product worthy of play. Levels may be moved back and forth to different game positions or completely erased from the screen and disk. A scoring screen may also be cleared at any time high scores need to be started from scratch.

If you enjoyed the classic Apple Panic with its ladders and floors and nasty human-eating fruit, you're going to truly love Lode Runner. Without a doubt, Broderbund Software has another classic in the making with this action game and generator.

Broderbund is located at 17 Paul Drive, San Rafael, CA 94903. Price is \$34.95. ■

Hartley Lesser
Hayward, CA

New Publications

edited by Joan Witham

Over 50,000 Software Packages

Information on over 50,000 software packages can be accessed from an on-line database, in a quarterly software catalog or through a customized software report. For more information, contact the International Software Database, 1520 S. College Ave., Ft. Collins, CO 80524.

Project Easylog

In launching Project Easylog (a program for promoting ease of access to information around the world), Sitenet, a business

database, will enable computer users to report, nation-by-nation, their experience in logging onto any database in the United States. Contact Conway Publications Inc., 1954 Airport Road, N.E., Atlanta, GA 30341, for further information.

Personal Computer Accessories Catalog

A free illustrated catalog listing their computer accessory line (Compu-Covers, Super Tabs, Calc/Pad, etc.) is available from Compu-Quote, 6914 Berquist Ave., Canoga Park, CA 91307.

VDT News

Worried about the health and safety problems associated with video display terminals? VDT News is a bimonthly newsletter that investigates health problems and new developments in the VDT health and safety debate. For further information, contact VDT News, PO Box 1799, Grand Central Station, NY 10163.

Uniform Coding Standard

Associated Technology has announced a uniform coding standard that can be used as is or tailored to establish a company's pro-

gramming practices. The 62-page guide covers documentation and coding practices for Cobol, Fortran and Basic. It is available for \$23 from Associated Technology Company, RT2 Box 448, Estill Springs, TN 37330.

MIDI Specification Manual

The Musical Instrument Digital Interface (MIDI) group is offering a MIDI Specification Manual for \$10 or received as part of the membership fee. Contact IMA, 8426 Vine Valley Drive, Sun Valley, CA 91352, for further information.

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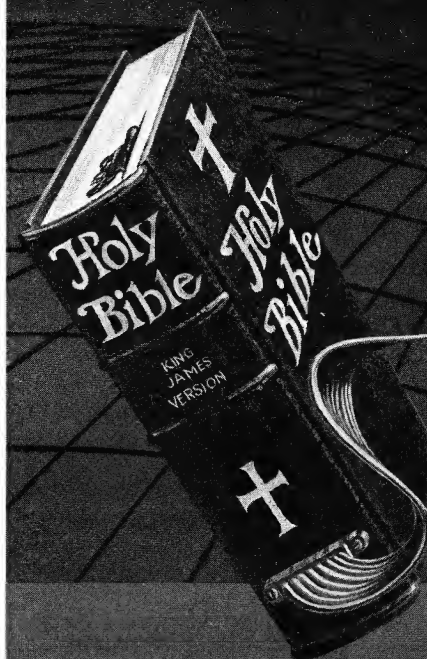
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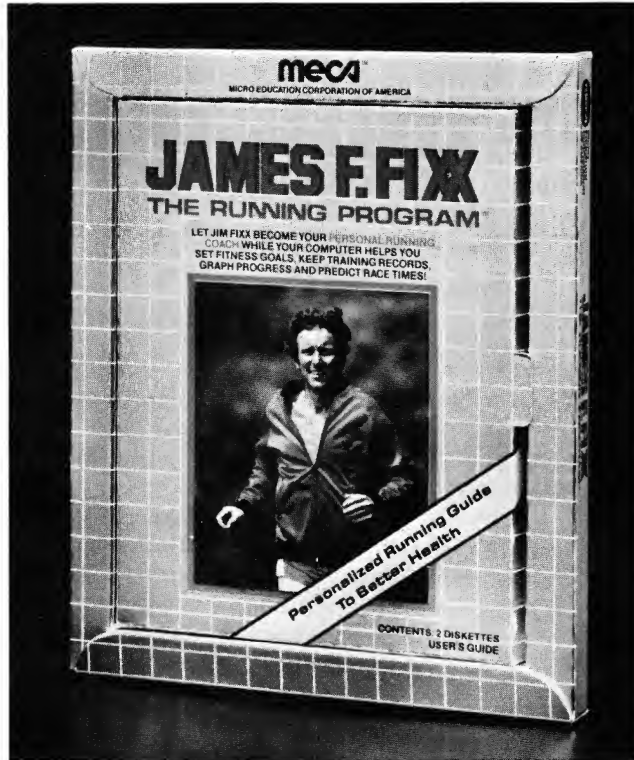
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edited by Joan Witham

Running Program

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Jogging program.

Runner's Log

Jogger provides a convenient means of keeping accurate records of a jog-

ger's progress. It graphs distance, time, pace and aerobic points. The program is available for \$27 from Parsons Software, 1920 Briar Meadow, Arlington, TX 76014. Reader Service number is 462.

Kids Say the Darndest Things to Computers

Art Linkletter unveiled his latest creation, *Kids Say the Darndest Things to Computers*. It is available for \$39.50 from Home-Computer Software Inc., 1307 S. Mary, Suite 209, Sunnyvale, CA 94087. Reader Service number is 457.

Krell Educational Software

Socrates Logo, Shakespeare and the Dragon, and B.E.S.T. are new educational programs from Krell Software, 1320 Stony Brook Road, Stony Brook, NY 11790. Socrates Logo extends the interactive capacity of Logo and incorporates new flexibility in defining primitive commands, error messages, and higher order decision-making commands.

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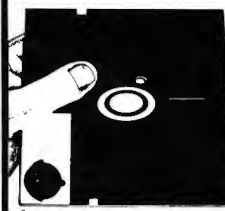
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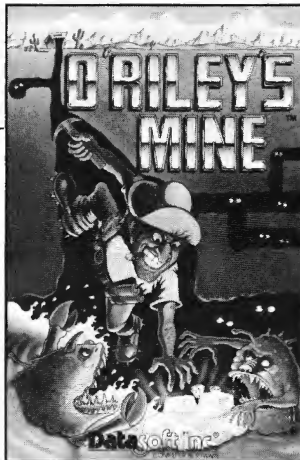
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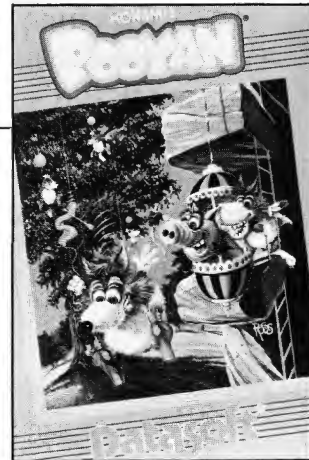
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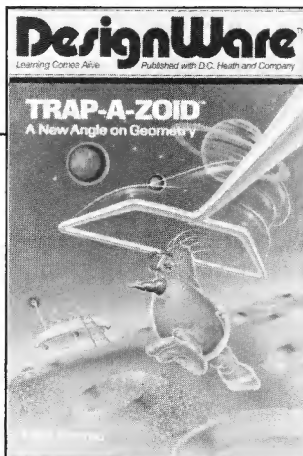
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Trap Zoids and learn geometric shapes.

Zoids by connecting the dots on the screen to form geometric shapes. Levels of difficulty and speed are selected by the player. Trap-A-Zoid is available for \$39.95 from Designware Inc., Bldg. 3, Suite 158, 185 Berry St., San Francisco, CA 94107. Reader Service number is 469.



Amperware screen shot.

Amperware

Amperware is a utility specifically designed to enhance the programming capabilities of Applesoft Basic. New commands support upper/lowercase character entry without additional hardware, full in-line editing, and special characters. Disk commands recall information up to 20 times faster. The software with documentation retails for \$49.95 from Scientific Software Products, 3171 Donald Ave., Indianapolis, IN 46224. Reader Service number is 460.

Trap-A-Zoid

Trap-A-Zoid motivates children seven and older to recognize and draw over 20 geometric shapes. The object of the game is to trap moving creatures called

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Discwasher's Clean Runner, an interactive disk drive cleaner that efficiently cleans disk drive heads, reduces computer downtime and maintenance costs and extends the life of your drive head and disks, is available for \$24.95 from Discwasher, 1407 North Providence Road, PO Box 6021, Columbia, MO 65205. Reader Service number is 452.



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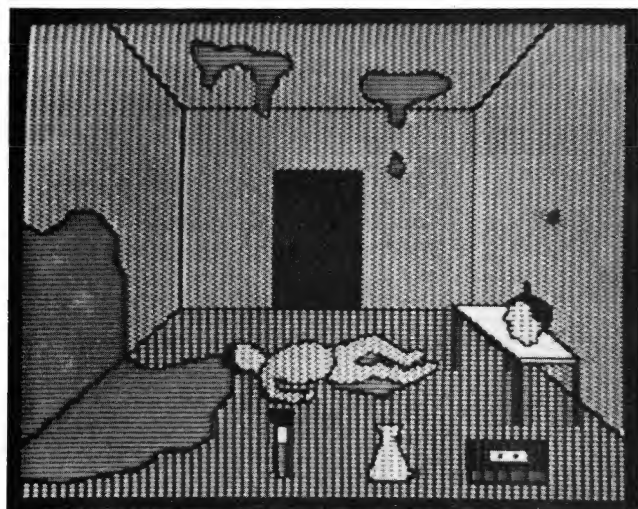
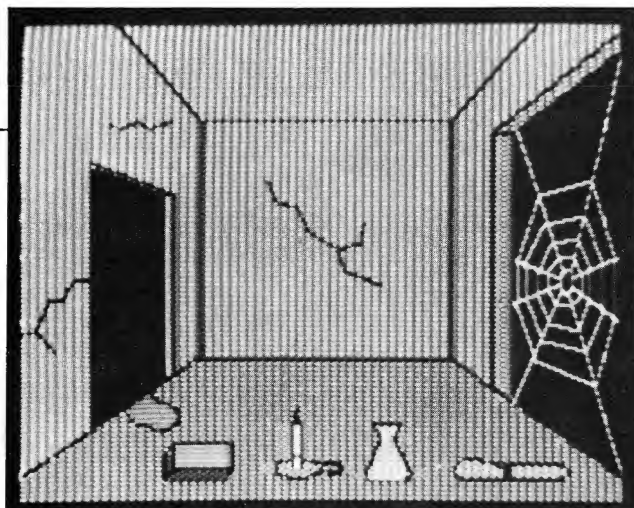
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Bank Street Speller

Bank Street Speller automatically proofreads text created with Bank Street Writer. It searches

out spelling errors and typos and highlights them in context. Screen layout, control keys, easy-to-follow menus and prompts are the same as the Bank Street Writer. It is available for \$69.95 from Broderbund Software, 17 Paul Drive, San Rafael, CA 94903. Reader Service number is 465.

Hayden's New Games

New releases from Hayden Software are Sargon III, Factor Blast, and Monkey See, Monkey Spell. In this latest chess game update, Sargon III offers a higher degree of difficulty, faster speed of play, an option whereby a game in progress can be saved to disk, and a complete learning environment for \$49.95.

Monkey See, Monkey Spell is a spelling game for children aged four and up that combines a fast action game with spelling. Six levels of difficulty are

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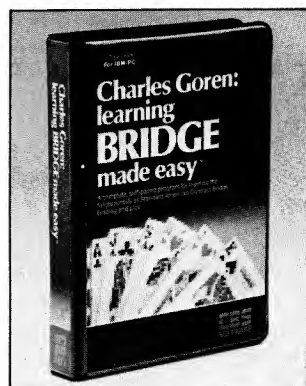


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available for \$29.95.

Factor Blast (\$29.95) teaches factoring concepts to students aged ten and up, who select numbers on a grid for an opponent to factor. For further information, contact Hayden Software Company, 600 Suffolk St., Lowell, MA 01853. Reader Service number is 455.



Learn Bridge with Charles Goren.

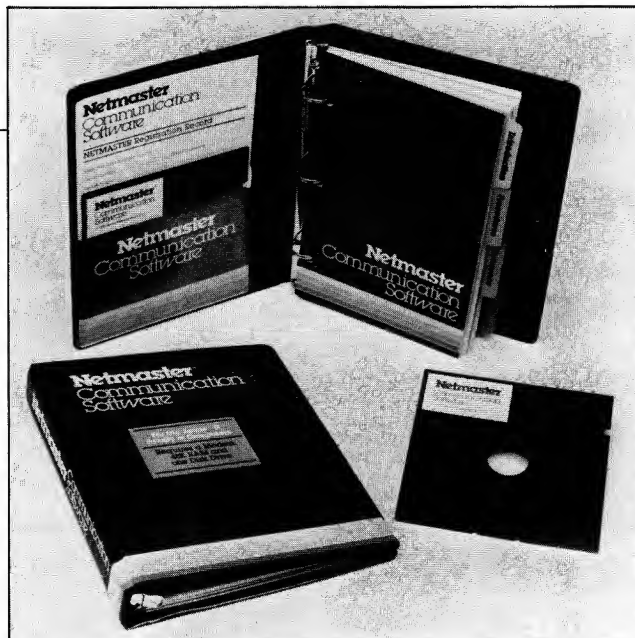
New Programs from CBS

Murder, bridge and math inspire three new packages

from CBS Software, One Fawcett Place, Greenwich, CT 06836. Murder by the Dozen (\$34.95) is a logic and deduction game playable by up to four would-be detectives. You are challenged to investigate and unravel 12 cases of murder.

Charles Goren's Learning Bridge Made Easy disk, with accompanying 144-page book (\$79.95), teaches bidding (covering such topics as hand evaluation, opening bids, responses and rebids) and provides 100 specially selected hands for practice.

Success With Math, a series of math review programs, helps students learn and practice math skills at their own pace. Students can choose the number and difficulty level of the problems they wish to solve. The four Success With Math programs, each \$24.95, cover Addition/Subtraction, Multiplication/Division, Linear Equations and Quadratic Equations.



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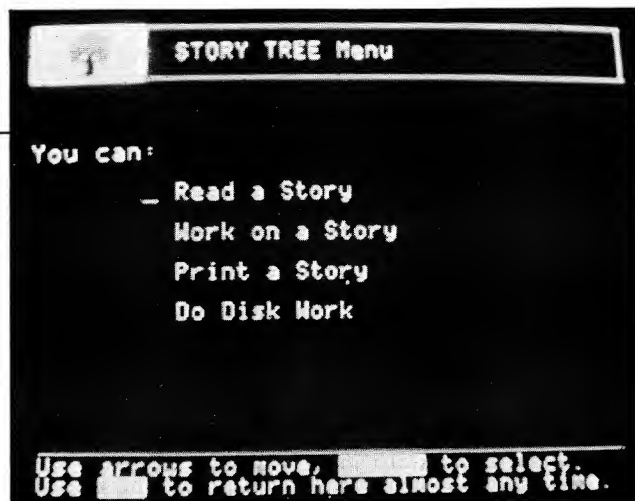
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New Software



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Creative Writing with Story Tree

Scholastic Inc. has introduced a program with which children can write stories that branch out like trees, making a different story each time. Story Tree is a story processor through which children can write, edit or change story lines, store their creative efforts and print out their own creations. It is available for \$39.95 from Scholastic Inc., 730 Broadway, New York, NY 10003. Reader Service number is 456.

The suggested retail price is \$40. Reader Service number is 450.

Integrated Software

Integrated software packages for the Apple II and III combine word processing, database management and financial modeling into a single program. AppleWorks for the II (\$250) and III E-Z Pieces for the III (\$295) also include a desktop manager that handles utility functions such as loading and saving files, formatting disks and specifying printer information. Both programs can use Apple's ProFile hard disk and data files can be used interchangeably between Apple II and III computers. Contact Haba Systems Inc., Van Nuys, CA, 91405 for further information. Reader Service number is 459.

Basketball Stars on Hit Program

Boston Celtics star Larry Bird and Julius Irving of the Philadelphia 76ers are the stars of One-on-One from Electronic Arts, 2755 Campus Drive, San Mateo, CA 94403. Players can choose one character and play against the computer, or two players can play directly against each other. Realistic animated graphics capture the excitement of NBA basketball. The game includes a 24-second-shot clock, a game clock and a scoreboard.

Books! The Electronic Ledger

Books! is an easy-to-use electronic accounting package from Systems Plus Inc., 1120 San Antonio Road, Palo Alto, CA 94303. Led-

ger sheets appear on-screen and entries are made with a few keystrokes. You can scan or add to the chart of accounts while doing a journal entry. Books! includes a core program and five special-purpose modules that together retail for \$745. Reader Service number is 468.

The Computing Farmer

To survive in today's volatile farm economy, farmers will have to use more sophisticated management systems. The Reaper Crop Production Management System gives up-to-the-minute control of the farm operation. Management and accounting reports offer information on yields, production practices, soil tests, fertilizer and chemical use for each field, inventory control, projections of costs and future crops to market, and tax planning, among other features. It is available for \$1295 from Reaper Software Company Inc., 808 Oleana Ave., Willmar, MN 56201. Reader Service number is 463.

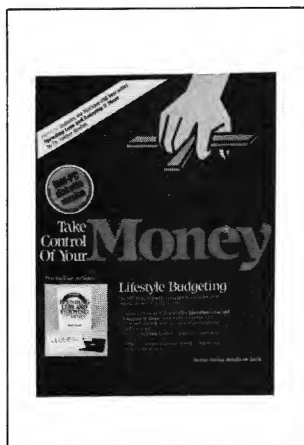
Control Your Home Environment

Smarthome I uses an Apple computer to monitor a security system and control lights and electrical appliances in the home or office without tying up the machine. It offers sophisticated real-time graphics software in a practical everyday product. The basic starter kit sells for under \$600 and includes a controller unit, wireless secur-

ity sensors, handheld remote controller, powerline appliance controllers and software. For further information, contact Cyberlynx, 4828 Sterling Drive, Boulder, CO 80301. Reader Service number is 454.

Take Control of Your Money

Lifestyle Budgeting, a forecasting and modelling tool, features the book *Spending Less and Enjoying It More*, a software disk and a user's manual for \$49.95. In addition to assembling family financial records, Lifestyle Budgeting distributes annual income into 12 monthly budgets. An original bud-



Lifestyle budgeting.

get and two revisions can be displayed simultaneously. Color graphics can be used for easy-to-read bar graphs that compare expenses and income, or pie charts that categorize expenses. For further information, contact Culverin Corporation, PO Box 503, Dayton, OH 45459. Reader Service number is 467.



Hats off to a machine language teaching system that works.

Machine language programming isn't easy, but you don't have to be a genius to learn it. Despite what you may think after getting lost in umpteen "How to program the 6502" books. Let The Visible Computer: 6502 and your Apple teach it to you.

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For Apple II Plus and IIe computers. \$49.95 at better software dealers, or direct from Software Masters, 3330 Hillcroft Suite BB, Houston, Texas 77057. (713) 266-5771. Bank cards accepted. Please include \$3.00 shipping.



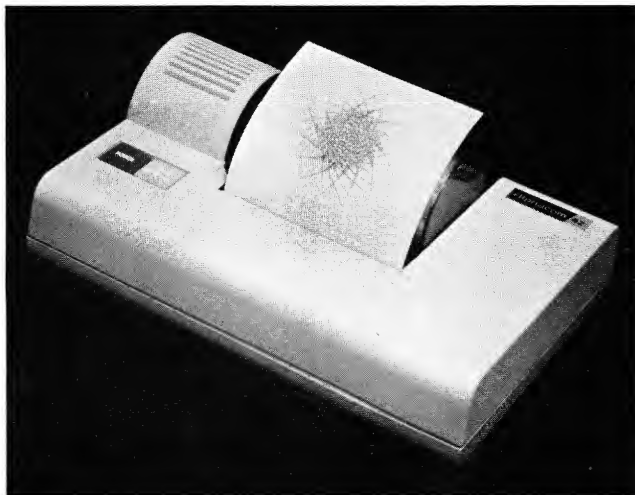
The Visible Computer: 6502.

New Products

edited by Joan Witham

Low-cost Printers

Priced at \$99.95 (including interface cables), the Alphacom 42 universal 40-column printer is available from Alphacom Inc., 2323 So. Bascom Ave., Campbell, CA 95008. The Alphacom 81 features 80-column printing for \$169.95. Interface cables are extra. Reader Service number is 478.



Alphacom 42 breaks the \$100 price barrier.

Antiglare/Antistatic Screen

The Power Screen is a dynamic microfilter screen that protects the worker and the terminal by completely eliminating the static electric field as well as blocking out reflective light. Suggested retail price is \$49.95. Contact Screen Data Corporation, 240 Cedar Knolls Road, Cedar Knolls, NJ 07927, for more information. Reader Service number is 479.

Tech-Sketch Light Pen

Tech-Sketch Light Pens work directly on the CRT screen to access computer programs and manipulate data. LP10-S controls the cursor by screen contact and LP15-S controls the cursor up to six inches from the screen. Priced from \$39.95, each Tech-Sketch Light Pen includes a Paint-N-Sketch I program that enables the user to draw pictures in color on the screen. For more information, contact Tech-Sketch Inc., 26 Just Road, Fairfield, NJ 07006. Reader Service number is 475.

ProFile Hard Disk Drive

ProFile, Apple Computer's Winchester-technology disk drive, can be used with the Apple II using ProDOS and the Ap-

ple Pascal Development System. ProFile is packaged with Backup II, a software utility that backs up and restores files stored on ProFile, and an interface card to connect Pro-



Tech-Sketch Light Pen includes Paint-N-Sketch program.

File to one of the Apple II's expansion slots, plus a software utility to manage Pascal Files on ProFile. Suggested retail price is \$2200 from Apple Computer, 10260 Bandley Drive, Cupertino, CA 95014. Reader Service number is 485.

Apple II Mouse

The mouse option opens up a new dimension of utility for the Apple II. AppleMouse II is packaged with MousePaint software to design charts, diagrams, free-hand drawings and other visual aids for reports and presentations. Users can insert text in a drawing and then choose from a variety of character fonts and fill patterns. Suggested retail price is about \$175. Contact Apple Computer, 10260 Bandley Drive, Cupertino, CA 95014, for further information. Reader Service number is 472.

Apple IIe Reference Card

This 16-page Apple IIe Reference Card is packed with carefully organized information for quick reference. Priced at \$4.95, you can order it from Nanos Systems Corp., PO Box 24344, Speedway, IN 46224. Reader Service number is 487.

COM Video Command Console

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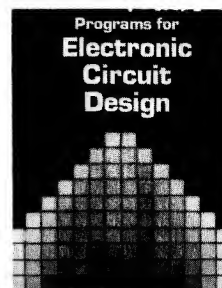
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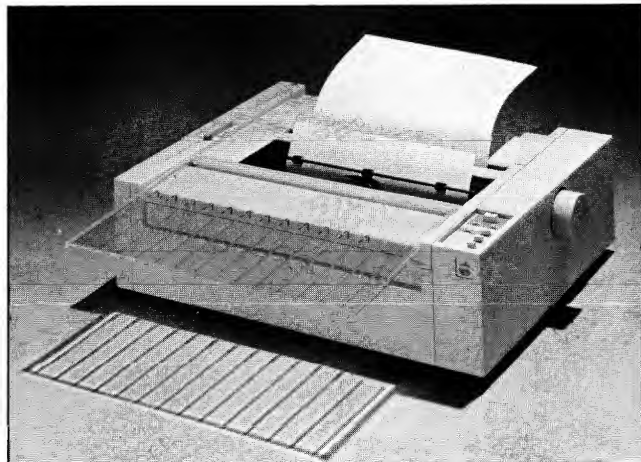


The COM gives your holding hand a break.

Because of its functional design, the COM allows the player to operate both joystick and keyboard together. The COM is sturdy and lightweight, and will accept a wide variety of joystick controls. It is available for \$24.95 (plus \$2 S/H) from J.V.W. Enterprises Inc., PO Box 20059, Indianapolis, IN 46205. Reader Service number is 490.

Imagewriter from Apple

The Imagewriter, a dot-matrix printer from Apple Computer, prints high-resolution graphics up to 180 cps and full text up to 120 cps. It uses a standard RS-232-C serial interface so it will connect directly to the Apple III's, Macintosh's or Lisa's built-in serial ports. Apple's Super Serial Inter-



The Apple Imagewriter has less operating noise.

face Card connects it to the Apple II Plus or Apple IIe. It uses either friction feed or pinfeed tractors and it accommodates paper from three to ten inches wide. Suggested retail price is around \$499 from Apple Computer, 10260 Bandley Drive, Cupertino, CA 95014. Reader Service number is 482.

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Stack*Rack computer workshelf systems come in nine different models. All models feature adjustable shelves so you can position your equipment at the most convenient height. Prices range from \$38 for a single small shelf to \$118 for the largest double shelf. Contact California Design Works, Box 3052, Monterey, CA 93940, for further information. Reader Service number is 481.

Data-Prompter

The DP-11 (accepts paper up to 11" wide for \$69.95) and DP-15 (accepts paper up to 15" wide for \$79.95) enable programmers to insert endless pencilled programs on print-out paper for keying into the computer. When typing in programs from magazines, the Data-Prompter reduces input errors and increases speed by positioning copy for comfortable reading. You can obtain them from Close Enterprises, PO Box 13903, Arlington, TX 76013. Reader Service number is 483.

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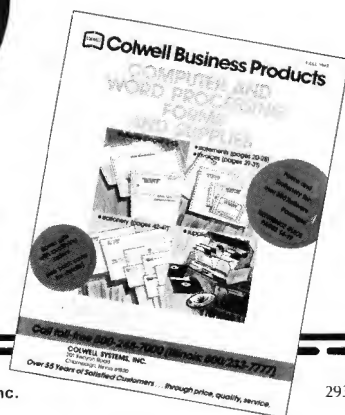
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SOFTWARE BRAND	PACKAGE #	<input type="checkbox"/> DO OWN PROGRAMMING
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\$99. For more information about this 300-baud modem, contact USI Computer Products, 71 Park Lane, Brisbane, CA 94005. Reader Service number is 474.

CRT Table

The EC10 mobile CRT table can hold a complete microcomputer system and provide a work area. It includes a three-outlet electrical unit with a 20-foot cord. Made of heavy gauge steel with a high-impact baked enamel finish in putty beige, the table moves on 4" casters with locking brakes. For more information, contact Bretford Manufactur-



Better mobility for your computer work area.

ing Inc., 9715 Soreng Ave., Schiller Park, IL 60176. Reader Service number is 480.

Apple Armor

Apple Armor encloses any Apple II series computer, disk drives and fan in a heavy steel, locked cabinet, securely fastened to any wood or metal surface. It secures the monitor cord and locks the main power cord, rendering the computer useless. Apple Armor is priced at \$115 from Omni Tech Corp., 1455 North Barker Road, Brookfield, WI 53005. Reader Service number is 488.

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Turtle Tot

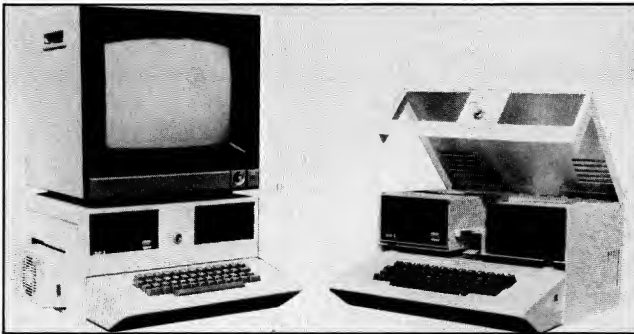
Turtle Tot, a robot built in Australia by Flexible Systems of Hobart, Tasmania, can move, draw, turn, blink its eyes and feel its surroundings with touch sensors, as well as

talk with an optional speech package. It is a fascinating way to learn to program in Logo, Basic or other high-level languages at home or in the classroom. The Turtle Tot is controlled via an RS-232 serial interface to

your Apple. Fully assembled it costs \$299. For more information, contact Harvard Associates Inc., 260 Beacon St., Somerville, MA 02143. Reader Service number is 473.

Power Surges Beware!

The typical home receives over 2000 power spikes and surges a year which can cause severe component damage, mis-



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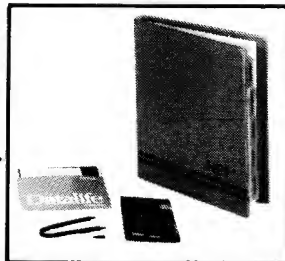
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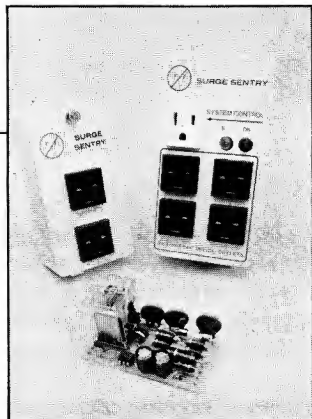
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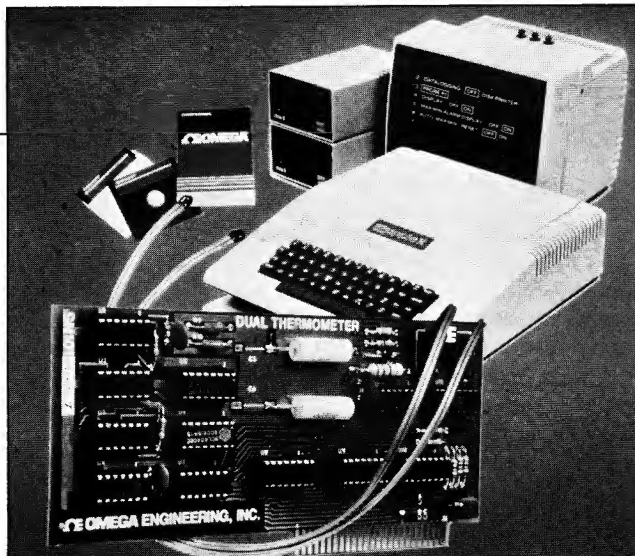
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Control temperatures with the Dual Thermometer.

Rana 8086/2

Rana Systems has linked the power of the microprocessor and software to the power of the Apple II com-

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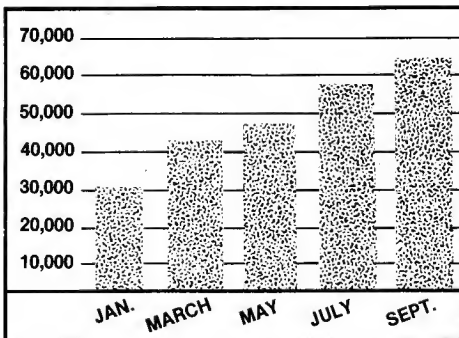


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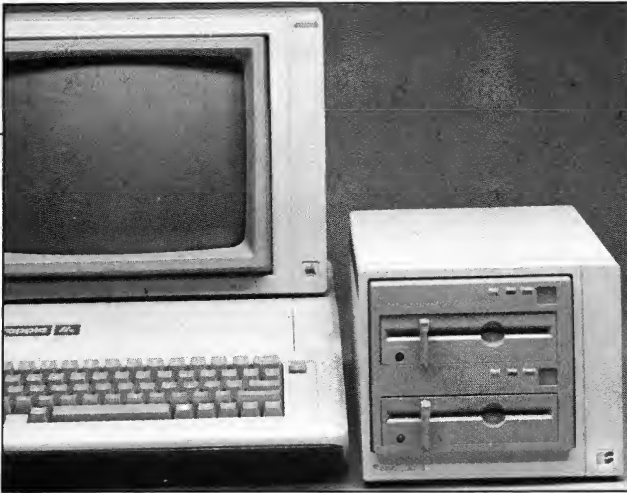
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Computer work station from Hamilton Industries.

number is 489.

Computer Furniture

A 12" two-drawer unit with hardwood drawers (X1000 microcomputer work center) is available for \$244 from Hamilton

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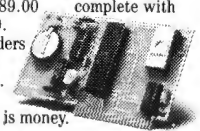
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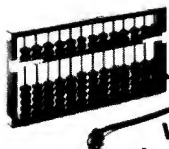
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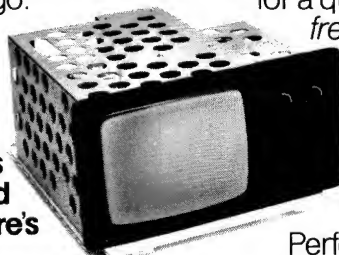


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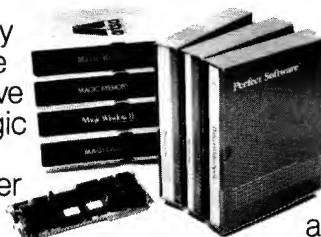


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